A Living Landscape : Bronze Age settlement sites in the Dutch river area (c. 2000-800 BC)

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6 In search of Bronze Age farmsteads: analysing prehistoric house-sites

6.1 Introduction

After having discussed the history of the concept of the 'farmstead' in settlement archaeology and having forwarded the more analytical term 'house-site' (Chapter 3), a qualitative selection of Middle Bronze Age settlement sites from the Dutch river area has been presented (Chapter 4), whose constituent settlement site elements have been discussed in detail in the previous chapter. In the present chapter, these lines of enquiry are recombined, in order to answer the question of what the nature of Bronze Age house-sites in the river area was. To this end, a systematic methodology for analysing house-sites is introduced and applied to the data from the Dutch river area.

As stated in chapters 1 and 3, Bronze Age settlement sites have seen little direct analysis targeted at establishing the nature of the house-site. Thus, specific questions like 'What are common and less common elements?', 'What spatial interrelations existed between the different elements at a Bronze Age house-site?' and 'Are house-sites physically defined?' have only rarely been raised and have never been dealt with systematically. Rather, archaeological accounts are generally rather descriptive (*e.g.* 'several granaries are found next to the farmhouse') and rarely comparative in nature. While it is generally implicitly assumed that 'some ordering' of the house-site was current in prehistory, the nature of this 'ordering' and the methodology by which it is investigated is usually not described.

It has already been suggested in chapter 1 that the (superficial?) similarities of some of the Bronze Age house-sites to sub-modern agrarian farmsteads may have caused this apparent lack of systematic research (section 1.2). To consider the 'logic' of prehistoric 'farmsteads' as something that goes without saying, may well be the result of false analogies inspired by the culture-historical- and romanticist sentiments of contemporary society at large, or even personal memories and experiences.[1] In this sense, it may be important that the Dutch scholars working with the results of the first large scale settlement excavations in the sixties and seventies of the former century, grew up in a period when the Dutch landscape was still to a larger extent shaped predominantly by agricultural use than today.[2] The fenced-off early 20th century farms, with clearly defined functional areas and outbuildings,[3] would have been a phenomenon which was still abundantly present in the landscape and very much part of every-day rural life back than.

Based on the above observations, there is a clear risk that archaeologists dealing with Dutch later prehistoric settlement sites, tacitly project a 'natural' and unspecified farmstead concept back to the past when discussingprehistoric 'farmsteads'. This need not be erroneous, and Bronze Age farmsteads may very well have shared properties with sub-modern farmsteads, but a detailed and systematic analysis of Bronze Age house-sites has never been undertaken. Therefore, this is one of the main goals of the present chapter.

6.2 Order in prehistoric house-sites?

Any analysis of house-site ordering should start-off with a critical evaluation of its concepts. The use of the word 'ordering' can be particularly misleading, as its meanings range from descriptive (*e.g.* a sequence, arranged or regulated conditions) to normative (*e.g.* prescribed or customary modes of behaviour, forces of harmony and regularity in cosmology). I will first comment on the latter and thereafter the former and their relevance to the present investigation.

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1 *Cf.* Lemaire 1997; Bazelmans, Kolen & Waterbolk 1997; Brück 1999a, 64.

2 *Cf.* Hendrikx 1989, 104-110; Reijnders 2002(1997), 100; Boivin 2003, 154-159; Stobbelaar & Hendriks 2003, 26 table 1, Pols *et al.* 2005, 11-14.

3 Blink 1902; 1904; De Hullu 1937; Trefois 1941; Bijhouwer 1943; Everhard 1965; Bieleman 1987; Albers 1990; Bierema & De Vries 2000 (1994); Voorhorst 1996; De Vroome 1996; Van Ooststroom 1998; Smallegange 1999; Leopold 2001; Verhagen 2002; Scholtens 2004.

To strive for 'order' (to counter 'chaos'?) hints at processes underlying the creation of ontological security and structures well beyond direct scientific research questions.[4] Being human, classification (ordering) is central to our cerebral processes that allow us to function in everyday life.[5] These remarks indicate three important pitfalls.

First, the ordering of any data relies on criteria by which these are handled. Just as fruits can be sorted by colour, taste or shape with equal validity, there is no preset, 'logic', ordering of prehistoric house-sites (*cf.* Agorsah 1993, 8; Miller 2005, 399-401). Order in prehistoric house-sites is only visible to the extent that, if challenged by specific research questions, different hypotheses will yield more (or less) comprehensible outcomes. To put it more simply: looking for house-site structuring is largely an etic process, with patterned data easily being misrepresented as being informative of 'prehistoric ordering'.[6]

Second, it is important to consider to what extent the quest for prehistoric house-site 'ordering' is not a moot point. Whereas the argument above stressed the problems of the knowability and the unwarranted transposition of viewpoints from present-day to prehistoric situations, the problem may be much more fundamental. If one accepts the assumption that for any human society, regardless of place and time, their everyday environment is seen as being imbued with a 'natural' or 'logical' ordering,[7] the search for such 'ordering' is transferred beyond of the realm of possibilities of archaeological research. To put it otherwise, it is very well possible that Bronze Age farmers, like any other human being, conceived of their (house-site) environment as an ordered, structured, and very much logical locale, regardless of its appearance to present-day researchers.

Third, an archaeological perspective on house-site ordering is naturally flawed. Dealing with fragmented relicts, in varied states of preservation, Pompeian circumstances are rarely a reality. This indicates that our data set may be blurred significantly by the palimpsest nature of the archaeological record. A swarm of postholes that can no longer be disentangled may hide a multitude of use-phases characterized by any distinct – and changing – ordering in former times. Consequently, low density patterns (*e.g.* low feature and/or structure densities) are at risk of being regarded as 'Pompeian' or 'snapshot' situation when they can in fact could have been formed over large time periods, just as high density patterns may be dismissed as 'chaotic' or 'unstructured' while these represent the superimposed remains of several, once distinctly ordered, use-phases.

In short, based on the above considerations, archaeologists are limited to pattern recognition, and for each of the patterns discovered, it is appropriate to reflect on whether the question asked had prehistoric relevance, or what inferences on prehistoric behaviour can justifiably be made. Yet, for any approach, the underlying assumptions and intended results should be made explicit.

6.3 Visual Analysis of Spatial Overlays (VASO): assumptions, aims, results

In absence of a methodology suitable for the systematic analysis of settlement site or house-site structuring, one had to be established in the context of this study. This approach has been labelled 'Visual Analysis of Spatial Overlays' (hereafter VASO in short). This methodology relies on computer generated overlays of excavations plan from settlement sites, which are thereafter inspected visually in order to trace and outline specific patterns. [8] Examples

4 *Cf.* Ingold 2000, 160-161. As Laing (1965, 42) stated: [only] 'If a position of primary ontological security has been reached, the ordinary circumstances of everyday life do not afford a perpetual threat to one's own existence.' *Cf. opus cit.*, 82: 'The reality of the world and of the self are mutually potentiated (…)'.

5 *Cf.* Hallowell 1955, esp. 40; 75-91; 186; Douglas 1966, 36; Casson 1983; Lawrence & Low 1990, 477-478; Segal 1994, 24-25; Jenkins 2000, 7-8; Ingold 2000, 160-162.

6 This, consequently, necessitates explicit discussion of what 'order' is looked for in archaeological enquiries. Remarkably, the contributions in the volume by Parker Pearson and Richards (1994) called 'Architecture and Order' rarely address such issues (but see Parker Pearson & Richards 1994, 10-11). In addition, Hillier & Hanson's 'The Social Logic of Space' (1984) provides an example of *a priori* validity of etic notions of 'order', when they state that an anthropologically informed theory of space '(…) must account for basic differences in the ways in which space fits into the rest of the social system. In some cases there is a great deal of order, in others rather little (…)' (Hillier & Hanson 1984, 5; 52; 80).

7 *Cf.* Hallowell 1955, chapter 4; Hillier 1996, 40-43; Ingold 2000, 160-161.

8 Ian McHarg (1968) is accredited with the initial use of cumulative overlays in spatial analyses. For an critical discussion of the strengths and weaknesses of overlay analyses in GIS in general, see Unwin 1996, esp. 132-134. For other or related archaeological approaches using spatial overlays see for instance: Bersu 1940, 50 fig. 10; Gregg *et al.* 1991; Kroll & Price 1991, 2; Fletcher 1995, 59; Veil & Breest 2004, 350 fig. 3; Therkorn 2004, 86 fig. 29; Gröhn 2004, 274 fig. 61; 332 fig. 63.

of such patterns are, for example, the spatial locations of wells or outbuildings in relation to house plans or each other. Through such analyses, specific hypotheses on the ordering of prehistoric house-sites can be made testable. Moreover, this technique allows studying differences between house-sites of different settlement sites and may thus allow analyses and generalizations at several spatial scales. I will describe this methodology in more detail below, prior to applying it to data on Bronze Age settlement sites from the Dutch river area.

6.3.1 The hypothetical house-site

At the base of VASO lies the concept of the 'hypothetical house-site'. Based on the commonly used descriptions for prehistoric 'farmsteads' (section 3.2.2) and information available on sub-modern rural farmsteads (note 3), a generic, model 'farmstead' or house-site may be envisaged.[9] Such a house-site would comprise a farmhouse building, around which open areas and outbuildings are encountered. Possibly, a functional logic steered the location of different house-site elements in relation to the house, and some elements (*e.g.* open areas, outbuildings) may therefore display a preferred spatial position in relation to the house.[10] Pits and wells can also be part of such a house-site, and the extent of this house-site is thought to have been physically marked by ditches or fences. As for dimensions, an area of 20-25 m around the house is often used (*e.g.* Fokkens 1997, 365; Theunissen 1999, 112-113).

The different elements of what may be called a 'model farmstead', are thus based on archaeological claims and historical analogies. Such a model farmstead is the – albeit often implicit – dominant framework for the interpretation of archaeological house-sites. In this study, such model farmsteads are not used as a descriptive reflection of past farmstead structuring, but as a heuristic device to steer archaeological analyses of prehistoric farmsteads. A technique that is capable of outlining the constituent elements and their interrelations for such a model farmstead is called upon (VASO; *infra*), as this can also outline differences and similarities between prehistoric and modelled farmstead structuring.

Assumptions

In order to allow comparison of prehistoric house environments internally (against each other) and externally (against house-site models), some assumptions for the hypothetical house-site must be made. First, in this study, a house-site is assumed to be situated within a 50 by 50 m square area. Second, the house is seen as being conceptually, as well as spatially central to the hypothetical house-site. In particular, the corresponding orientation of the farmhouse and other house-site elements may be an expression of such a conceptual and spatial interrelation. As most Bronze Age houses are orientated roughly northwest-southeast (see section 6.4.3), the farmhouse of the hypothetical house-site is also orientated northwest-southeast. Within the 50 by 50 square meter area, and around the farmhouse, fences, pits, wells, ditches and outbuildings are thought to cluster. These settlement site elements will provisionally be referred to as house-site elements below.

Hypotheses

Based on the above considerations and assumptions, a number of hypotheses can be forwarded, but endless others may be compiled.

1. If settlement site elements such as outbuildings, pits, wells, fences and ditches are indeed the typical constituents of the prehistoric house-site, one would expect them to occur exclusively or in greater numbers in close spatial association to the farmhouses.

9 To outline the distinctions more clearly: a 'model farmstead' describes elements and their interrelations for assumed farmsteads, a 'hypothetical house-site' is a geometric shape (in this study a 50 by 50 m square) centered on a documented house plan within which possible house-site elements and their interrelations are investigated, while the term 'farmstead' denotes (and describes) a structured house-site as observed historically or proven archaeologically.

10 For example, in sub-modern farmsteads, baking houses are freestanding due to fire-risks, a bleaching field is left unbuilt, walnut tree are planted near the byres to reduce the number of flies, and churning is done away from living areas as this attracted flies *et cetera* (see references in note 3).

2. If the house proper was central to the house-site, other house-site elements may display a correspondence through their placement (and/or orientation) in relation to the house.

3. If the spatial properties (location and orientation) of house-site elements were of importance, one may expect these conditions to have been respected in rebuilding.

4. If the placement of house-site elements bears no relation to the farmhouse, their distribution around the farmhouse should leave an even (random) distribution pattern.

5. If concepts of prehistoric house-site ordering were shared among the local community (in space and/or time) occupying a given settlement site, one would expect the house-sites of a given settlement site to be more similar internally, compared to house-sites from another settlement site.

In order to test these and related hypotheses, the number, distribution, orientation and interrelations of the relevant settlement site elements in the vicinity of prehistoric farmhouses must be analysed. This calls for a methodology, that allows the information on the nature of Bronze Age house-sites to be analysed in a systematic and controllable way. First, the technical procedure will be introduced below.

6.3.2 Technical methodology

The first step in the method of analysis is to identify the relevant house-site elements in the excavation plans. This can be done from both analogue and digital excavation plans. Thereafter, these elements need to be digitized as outlines, allowing for mapping at selected scales.[11] In this study, MapInfo and Autocad software was used. The result should be a multilayer vector file containing the layers with the outlines of houses, outbuildings, fences, ditches, wells, pits *et cetera*. The layer name should identify the house-site (*e.g.* number, label) and the elements present on that layer (*e.g.* pits, barns, fences).[12] The objects on these layers, should furthermore have a specific line property (*e.g.* colour or dashed) per layer, in order to identify them later in composite overlays. Essentially, the result is a simplified excavation plan, with the selected house-site elements recognisable by layer line type and the possibility to toggle on and off the visibility of these layers (fig. 6.1).

As the second step, copies of the resulting multilayer file are required, one for each recognized house(phase). These copies are named after their defining house(phase). Then, the copies are opened and the centre of their constituent house – defined by the centre of gravity for the area enclosed by the inner rows of the roof-bearing posts – is determined and indicated as a point. This centre-point will also form the centre of the hypothetical house-site. On a temporary layer, a 50 by 50 square meter area with its diagonals is drawn, whose centre-point is an arbitrary, yet known coordinate (*e.g.* 1000/1000) of the coordinate system used. Thereafter, the elements of all layers (save for the temporary layer with the square) are translated, with the house-centre point as the base-point, and the arbitrary centre coordinate (1000/1000) as the endpoint of translation. Next, all layers (save for the temporary layer with the square) are rotated to the necessary number of degrees to make the long-axis of the central house fit with the northwest-southeast diagonal of the square.[13] The elements which are thereafter situated outside the hypothetical 50 by 50 square meter area, may be cropped (deleted) from their respective layers.[14] The temporary layer with the square is removed and the file saved. This procedure is repeated for all copies containing separate house-phases (fig. 6.2).

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11 In theory, digitizing a 36 m perimeter around the centre of the house suffices (½√5000), but for the complementary analyses (*e.g.* distribution of elements inside versus outside hypothetical house-sites) the location of the elements outside the house-sites proper is needed. For efficiency, it is best to digitize all selected elements at this point.

12 Digitizing the excavation extent boundary is advisable as well, as this is necessary to evaluate 'empty' areas.

13 The northwest-southeast axis chosen here is arbitrary, but not trivial. Middle Bronze Age houses vary in orientation from west-east to north-south, but generally avoid a northeast-southwest orientation. Therefore, the perpendicular northwest-southeast orientation is used here as a generic default orientation (see fig. 6.15 and section 6.4.1 for details on house orientation).

14 While cropping increases clarity of composite overlay plots (*infra*), uncropped files may be used to check – or or look for – patterns at scales beyond the 50 by 50 m square used here

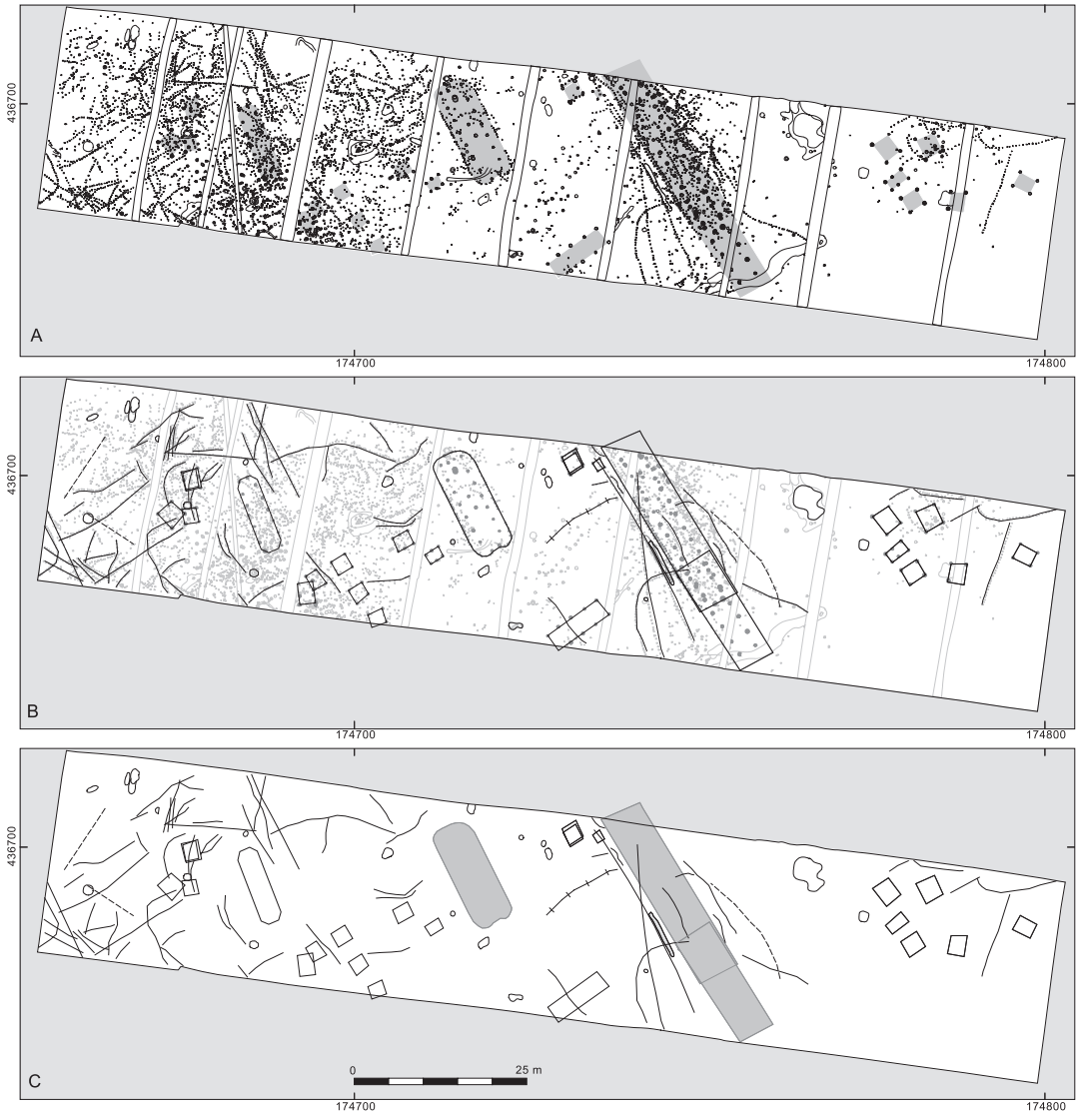


Fig. 6.1 Visual Analysis of Spatial Overlays (VASO), step one: digitizing the relevant outlines (A to C).

The third step is the compilation of a single file from the copies after translation and rotation. This is the creation of the overlay from which the method derives its name. In this file, all hypothetical house-sites of a given settlement site are represented by layers per element. This file allows comparison of the number, placement and orientation of house-site elements in relation to the defining farmhouses for all house-sites in a settlement site (fig. 6.3). By toggling on or off certain layers, the (dis)association of the house-site elements can be analysed. In this study, the excavation extents and the layer containing the scale bar and north-arrow has been toggled invisible in all images to improve clarity. For instance, questions of the sort 'Do pits cluster to the long side of houses?' or 'Are wells generally situated in the corners of systems of fences?' can now be investigated.

The visual aspect of the analysis is reasonably self-explanatory. Pattern recognition (such as the clustering of elements) relies on visual identification. Whereas one may apply more objective techniques for the pattern analysis (GIS based frequency or density analyses), human perception and sensibility appear still better suited to the task. GIS based analyses require polygon to centre-point or polygon to grid conversions for computation. Some archaeological data, such as fences and ditches, are spatially extensive and often of non-linear morphology, and are not meaningfully

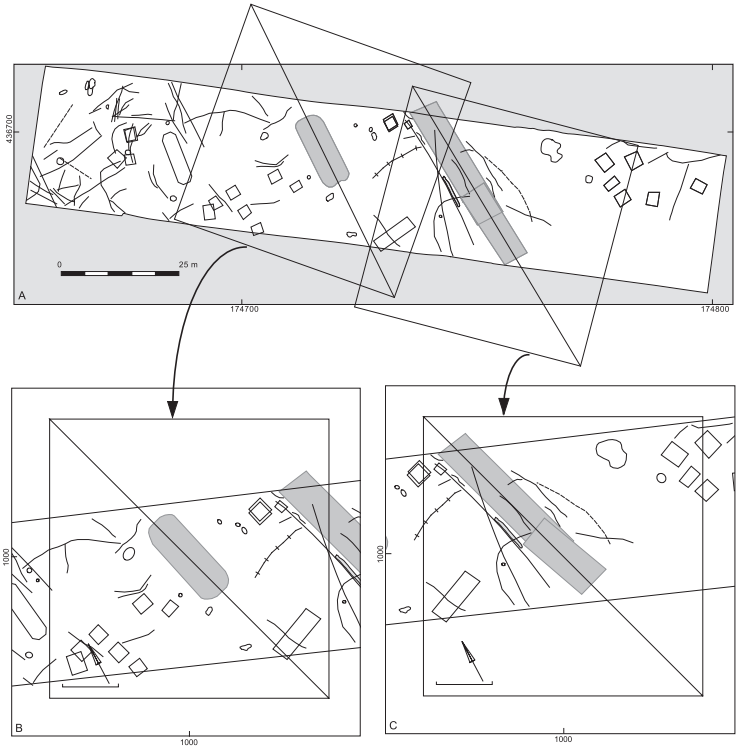


Fig. 6.2 Visual Analysis of Spatial Overlays (VASO), step two: translation and rotation around an arbitrary centre point.

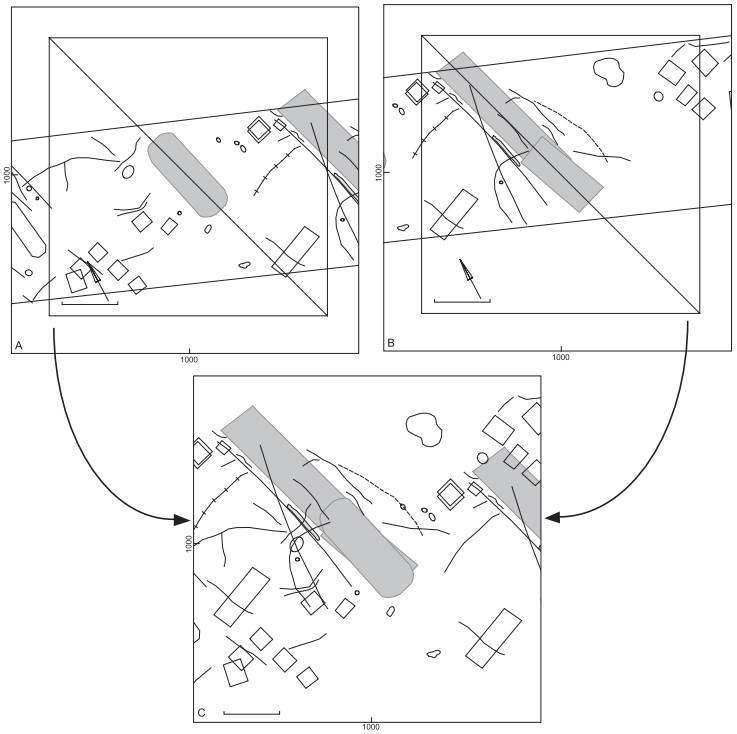


Fig. 6.3 Visual Analysis of Spatial Overlays (VASO), step three: creating the composite overlay.

converted (but for an example using outbuildings, see figure 6.22).[15] In addition, the observed phenomena need to be checked with the individual copy files or the master excavation plan, checked with the excavation extents and be placed in archaeological context. These tasks can hardly be (nor should be) automated. Furthermore, VASO is a tool for investigating specific spatial (inter)relations and not an end-goal in itself. The composite plots resulting from VASO are never meaningful in themselves, but are suitable to compile – and to certain degree test – meaningful inferences of archaeological relevance.

6.3.3 Problems, limitations and pitfalls

As stated above, VASO is a tool with archaeological potential, but which also is characterized by several obvious problems, limitations and pitfalls. The most severe of these problems is that of archaeological contemporaneity, or the 'palimpsest' problem. When digitizing elements for VASO, generally there are no individual dates for the elements incorporated available. This means that one is building on the assumption of near contemporaneity for the uncovered elements. To dismiss this problem lightly seems myopic, but quantification of this parameter is also difficult. In any case, in the situation where high feature densities are present within the ground plan of the defining farmhouse – and that can not be interpreted as belonging to the house structure proper – contemporaneity should be questioned. Obviously, the same goes for (settlement- and) house-sites where a large occupation period is suspected based on typological observations or absolute dates. Palimpsest situations can occur from temporal (same location, other time), as well as lateral overlap (same location, (near) same time), both of which should be reckoned with.[16]

Consequently, it is evident that briefly used sites – characterized by low feature densities – with no indications of previous or later use and with excellent feature preservation are ideal for VASO. Therefore, in this study all hypothetical house-sites have been evaluated for suitability (table 6.1). This allows the isolation of the best quality data to asses established patterns or inferences (*cf.* section 6.4.5).

criteria / classes	time-depth	extent of excavation	certainty of recognition	feature preservation
excellent	only Bronze Age one house-site low feature density	large areas around house plan	house plan certain recognized during fieldwork	many stakes or hoof-imprints and house walls preserved
good	only Bronze Age one house-site	house plan and direct vicinity	house plan certain	many stakes or hoof-imprints preserved
moderate	only Bronze Age multiple house-sites	complete house plan	house plan probable	some stakes or hoof-imprints preserved
poor	multiple periods	incomplete house plan	house plan insecure	no stakes or hoof-imprints preserved

Table 6.1 Criteria and classes used for the evaluation of house-site suitability in VASO.

The second main problem with VASO is the fact that it is predominantly confirmative in nature. The pre-selection of elements to be digitized (while being an archaeologically informed decision) means that other phenomena, are excluded from analysis although they could be just as informative (*e.g.* burnt patches). This can be overcome by adding extra layers for the phenomena to be included and theoretically by including the excavation all-features plan (and finds-distribution plans) in the analysis. The latter option is, however, prone to decrease the visual clarity central to VASO.

15 Theoretically, frequency of occurrence can be calculated for grid matrices which are of adequately small grid cell size to allow the mapping and counting of, for instance, fence lines. This would significantly increase computational complexity, while not accordingly increasing archaeological understanding. As an example, for a grid cell with value for fences of 2, it is unclear whether these are two parallel fences (*e.g.* a rebuilt fence) or two fences which run at right angles and only intersect within that cell. A visual approach allows distinguishing between the two.

16 As an example of the latter, imagine two houses 50 m apart on an east-west axis, labeled 'left' and 'right'. If the prehistoric preferred location of farmstead elements was 30 m to the west of the house, VASO of house 'right' will yield no elements, whereas those on 'left' are likely to be misinterpreted as belonging to that house.

Along similar lines, the size of the hypothetical house-site is an important factor. Certain patterns are visible only at larger scales and elements which in prehistory were seen as part and parcel of a house-site, are now – because of their distance to the centre of a house – possibly excluded. This problem too can be overcome reasonably easily. Size and shape of the hypothetical house-site have no technical restrictions, although again visibility may decrease with increased size. In addition, it is possible that in using more extensive hypothetical house-site areas, patterns unrelated to the proximal location to a prehistoric farmhouse distort the plot. Consequently, 50 by 50 m (*i.e.* 25-36 m from the house) is used here as an appropriate spatial scale.[17]

Additionally, the close proximity of prehistoric farmhouses used in VASO can pose a problem. If house-site elements, for instance outbuildings, are situated in between two houses, they will appear twice on the VASO plot. This duplication effect, however, is reduced if larger numbers of house-sites are overlain.[18]

A final, and more fundamental caveat is posed by the rotation of house-site elements to the northwest-southeast axis. This rotation facilitates comparison, but is also strongly reliant on the assumption that it is the (orientation of the) house which was the main determining factor in the placement and orientation of the other house-site elements. Assume, for instance, that the placement of the other house-site elements was not determined by properties of the farmhouse buildings proper, but on sets of rules influenced or determined by solar or stellar orientations. If preferences existed like 'house-site element 'x' should be placed to the (magnetic) south of the farmhouse entrance', and the orientation of the houses differed (yet was not of importance), the rotation of all house-site elements will blur the pattern (fig. 6.4). Ideally, VASO should be repeated without rotation, to investigate this. As however in most sites the differences between the orientation of the houses are minimal (see section 6.4.1), often a single-run (with rotation) of VASO suffices.[19]

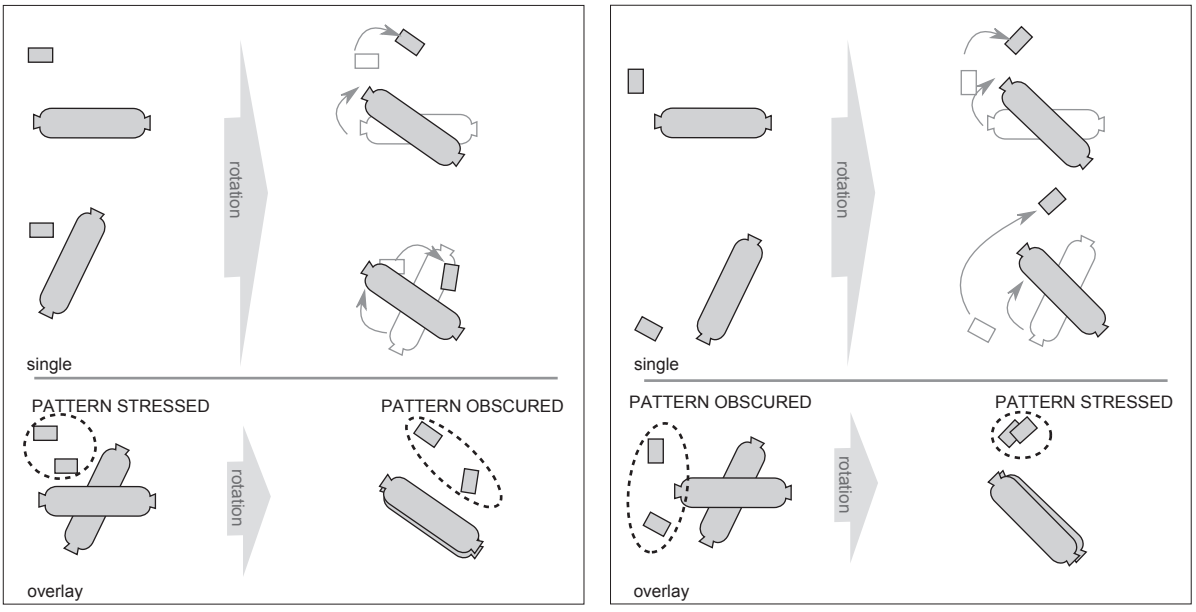
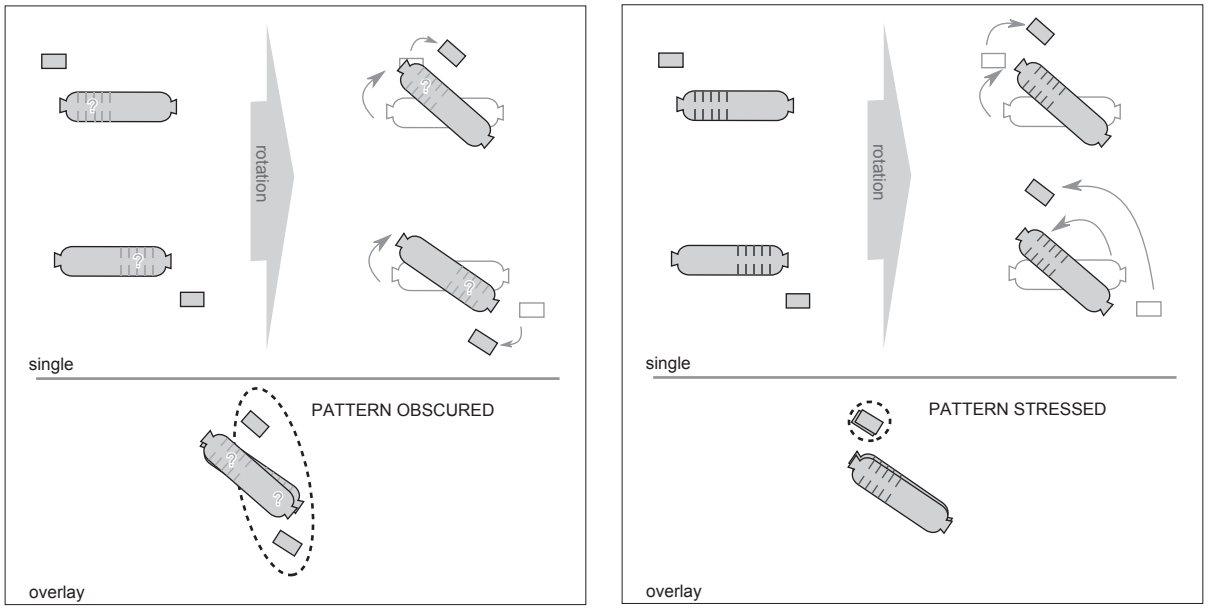


Fig. 6.4 Example of how rotation and house-site structuring rules can either enforce or obscure patterns depending on the nature of the rules.

17 See section 6.4.2.

18 Overlying larger numbers of house-sites can stress shared properties, and reduces the (visual) prominence of individual (outlying) observations. Consequently, overlying larger numbers of house-sites helps to determine which patterns are more generic (*i.e.* more widely shared) house-site structuring *within* settlement sites, or to outline difference for multiple house-sites *between* settlement sites.

19 Nonetheless, to allow verification of the results, both rotated and not-rotated VASO plots for all Bronze Age settlement sites from the Dutch river area are provided at the end of this chapter (figs. 6.37-6.59).



RULE: Outbuildings to the righthand side of the byre entrance; Byre-sections unclear

RULE: Outbuildings to the righthand side of the byre entrance; Byre-sections clear

Fig. 6.5 Example of how lack of information on functional divisions of the house, rotation, and house-site structuring rules can either enforce or obscure patterns depending on the nature of the rules.

In addition, some of the rules guiding house-site structuring may have been based on criteria which have no or limited archaeological visibility. As an example, the difficulties in recognizing byre sections in Bronze Age houses from the river area (see section 5.2.3.3 and fig. 5.17), complicates the study of the relation of house-site elements to such house-sections (fig. 6.5).

6.3.4 Analyses and interpretations: an introduction

For all of the Middle Bronze Age house-sites from the settlement sites discussed in chapter 4, VASO has been done against magnetic north as well as with all house-sites rotated towards NW-SE. In addition, the house-sites from the excavations at Tiel - Medel 8 (Van Hoof & Jongste 2007), have also been incorporated. For all these house-sites, the orientation of the houses and outbuildings has also been studied, and are represented by wind-rose diagrams. The images showing the VASO plots for the different house-sites (towards magnetic north and rotated) and the wind-rose diagrams for the settlement sites can be found at the end of this chapter (figs. 6.37-6.59). Only a selection of these images will be used here as illustrations to support key arguments.

First, a brief description of the seperate outcomes of the VASO for the different settlement sites will be offered. This will allow detailed discussion of the (backgrounds to the) patterns observable. Thereafter, any emerging patterns will be checked with the results of VASO done for all sites discussed in chapter four.

6.3.5 Zijderveld

The VASO plots and wind-rose diagrams (figs. 6.37-6.39) for Zijderveld show that the houses conform to a roughly WSW-ENE system of orientation. The single plan that deviated from this pattern is situated nearly exactly perpendicular to it, suggesting that 'at a right angle' may have been an acceptable (complementary, or even conforming) orientation for a Bronze Age house. Based on the plans published in Chapter 4 and Appendix I, it was concluded that this system of orientation is also reflected by the fences at Zijderveld, which extend beyond the (hypothetical) house-sites (section 4.2.3). Within the hypothetical house-sites, stretches of fence are frequently situated within 20 m of the houses and show roughly corresponding orientations. Only very few fences show a trajectory that suggests that they defined a perimeter around the house. Most fences run relatively straight, parallel, and extend beyond the houses.

Several fence-lines cross-cut the ground plans of the houses and outbuildings, indicating that several phases of use of the house-site need to be accounted for. This may also be assumed based on the frequent occurrence of multiple fence-lines ('bundles') on a given location (*cf.* fig. 6.26). It is furthermore important to note that fences of different types (types 1a and 2; see section 5.5) occur together in such 'bundles', since it has been suggested by Theunissen (1999, 168-169) that the different types may have had different functions. Their co-existence and similar orientation in such bundles, however may suggest otherwise.

No evident patterns are discernible in the few pits located on the Zijderveld house-sites. Mostly, pits are found to the north of the houses. Of the three pits to the south of the houses, two are rather large. Only for the larger pit on house-site 1 a function as a drinking pool can be argued for (Knippenberg & Jongste 2005, 63-65). These drinking pools generally contained most finds (some between 2 to 6 kg), whereas the other pits uncovered in the 2005 excavation never yielded more than 200 grams of finds. This renders an interpretation as refuse dumps for the latter pits unlikely. As also to the northwest of house 2 (fig. 6.37, B) and the north of the house 3 (fig. 6.37, C) larger pits have been interpreted as drinking pools, no preferred southern location for these pools may be assumed. The wells at house-sites 2 and 4 (fig. 6.37, B; D) are also situated to the north of the houses, but here numbers are too low to attach much value to this observation.

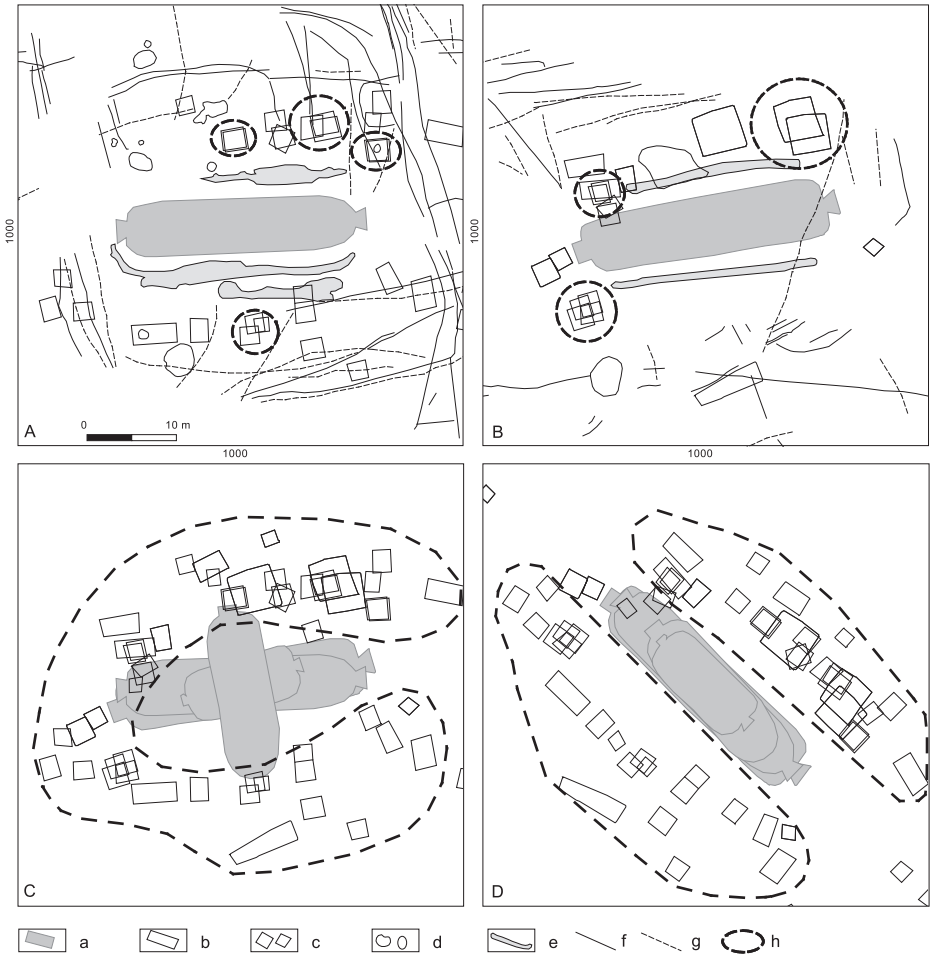


Fig. 6.6 Rebuilt outbuildings on house sites 1 and 3 (A, B; towards magnetic north) and the VASO plot for Zijderveld houses and outbuildings towards magnetic north (C) and for the rotated house-sites (D).

a: houses, b: barns/sheds, c: granary-type outbuildings, d: pits, e: ditches f: type 1a fences, g: type 2 fences, h: clusters of (rebuilt) outbuildings.

Many outbuildings are encountered at close distances to the houses. At least three outbuildings are present with all houses, usually conforming in orientation to their nearby farmhouse (compare the orientation of the outbuildings at house-site 1 and 4; fig. 6.37, A; D). On hypothetical houses-sites 1 and 3 the numbers are much higher (38 and 17 respectively), but the overlapping of outbuildings and houses at house-site 3 suggests multiple phases of use, whereas on house-site 1 some outbuildings may be Iron Age in date (see Chapter 4, section 4.2 and Appendix I for details). Even prior to overlaying house-sites, some clustering of outbuildings is discernible (fig. 6.6, A; B). At house-site 1, three four-posts outbuildings were rebuilt on the near-same spot and three overlapping four-post outbuildings to the south may also indicate repeated rebuilding. The generally high feature density and uncertain phasing of this house-site, unfortunately makes it hard to assess to what extent these all belonged to the Middle Bronze Age-B farmhouse house-site. At house-site 3, the Middle Bronze Age occupation phase proved easier to separate from later activity (see section 4.2; Appendix I for details). There, also three clusters of rebuilt nine- and four-posts outbuildings can be identified. Those outbuildings overlapping the Bronze Age farmhouse's ground plan and those situated directly in front of the western short side entrance are unlikely to be contemporaneous (fig. 6.6, B).

The overlay of all house-sites (figs. 6.6, C; 6.37, F) shows that outbuildings occur in a more or less elliptical zone between 5 to 20 m from the houses. In the rotated VASO plot (figs. 6.6, D; 6.38, F) the morphology of this distribution is somewhat different. There, the outbuildings represent two NW-SE oriented rows to the long sides of the houses. Moreover, there is less difference in the orientation of the various outbuildings. To the left-hand side of the eastern short side entrance, the clustering of outbuildings is intensified by the overlay. From these observations, it can be proposed that at Zijderveld:

(1) Outbuildings generally conform in orientation to nearby farmhouses and were frequently rebuilt.

(2) Outbuildings were preferably placed near the long side, with a tendency for a preferred location to the north or left-hand side of the eastern short side entrance.

(3) The areas in front of the short side entrances are predominantly left clear, which is logical considering one presumably had to enter or exit the farmhouse with wagons and livestock.

(4) Fences or bundles of fences (comprising different fence-types) run parallel to the house(-site)s but extend beyond them.

(5) Pits are relatively scarce and – if present – contain few artefacts (< 200 g).

6.3.6 Eigenblok

The predominant axis of house orientation at Rumpt-Eigenblok is NW-SE (six house phases on four to five house-sites), with only a single house oriented roughly E-W (fig. 6.7). This predominant axis is also visible in the stretches of fence at house-sites 2 and 5 (fig. 6.40, B; D). Note that on house-site 2, type-1a fences have been used exclusively, while on house-site 4, type-2 fences were used (for fence types see section 5.5). At house-sites 4 and 6a/b (fig. 6.40, C; E-F), only few and short fence lines could be reconstructed, which means that no arguments on their orientation should be made. At house-site 1 several stretches of type-1a fence-lines can be recognized, some of which may combinedly have delimited the house-site. These are the stretches of fence which run roughly parallel to the axes of the house and display chamfered corners at 10-15 m from the house. Two tentative stretches of fence to the northwest of house 5 (fig. 6.40, C; i) possibly also show a curved trajectory, which reflects a spatial relation to the house. Mostly, however, the longer stretches of fence such as those at house-sites 2 and 4 (comprising both type-1a and type-2 fences) extended in a linear trajectory beyond the confines of the hypothetical house-sites. Consequently, the house of house-site 5 is better interpreted as being situated near an intersection of systems of fences, than as being bounded by these (*contra* Hielkema, Prangsma & Jongste 2002, 136; 161).

The pits at the various Eigenblok house-sites are few in number and frequently overlap with the ground plans proper. As there are no arguments to suppose that these overlapping pits were once part of the storage facilities of the houses, it remains questionable which pits were ever contemporaneous to the farmhouses. Several of the larger pits

seem to occur more frequently to the (north)west of the houses (fig. 6.40, H and 6.40, L), but this overlay distribution is somewhat distorted by house-site 4, where several larger pits (possibly drinking pools; Hielkema, Prangsma & Jongste 2002, 122) occur in those areas. The Eigenblok pits generally contained no clues (*e.g.* finds, shapes) to hint at their original function. Only the larger pit between the two curved fences or palisades at house-site 5 (fig. 6.40; D; i) has yielded a quantity of finds that suggests a (secondary) function as a refuse dump. The two burnt patches (fig. 6.40, B-C; e) at house-sites 2 and 4 are of equally enigmatic function and furthermore may post-date the Bronze Age occupation (Hielkema, Prangsma & Jongste 2002, 108-109; 123).

Only one single well was found within the hypothetical house-sites, to the north-west of houses 2a-b (fig. 6.40, B; e). It was situated between parallel type-1a fences. If the fences ever defined a farmstead, the location of the well may have changed from in- to outside the farmstead or *vice versa* upon the replacement of the fence. As the well only yielded some bones of toads, the dating of the well to the Middle Bronze Age relies solely on stratigraphical arguments (Hielkema, Prangsma & Jongste 2002, 107-108).

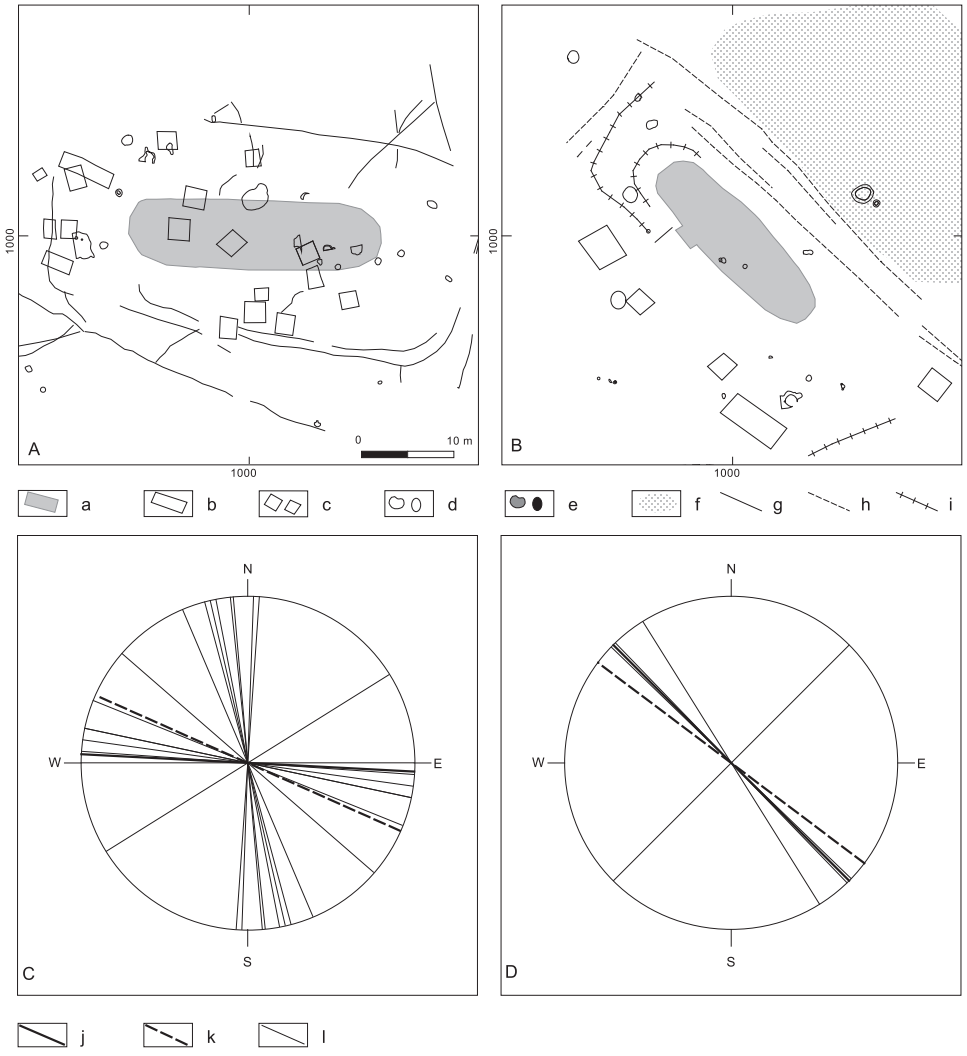


Fig. 6.7 VASO plots towards magnetic north for Eigenblok house-sites 1 (A) and 5 (B) and their wind-rose diagrams (C and D respectively).

a: houses, b: barns/sheds, c: granary-type outbuildings, d: pits, e: wells (dark grey fill) and burned patches (black fill), f: cattle hoof imprints, g: type 1a fences, h: type 2 fences, i: other fence types, j: orientation of houses, k: orientation of barns/sheds, l: orientation of the granary-type outbuildings.

At Eigenblok house-site 5, a ring-ditch possibly belonging to a funerary monument (a barrow) was excavated, but as this belonged to an older use-phase of the site (see section 4.3.5 and Appendix II), it has not been depicted on the VASO plots. It is unclear whether this older funerary monument was still visible at the time of Middle Bronze Age-B habitation on that house-site, as it may have been eroded by younger crevasse formation. For what it is worth, the area of the former monument appears not to have been intensively overbuilt during the Middle Bronze Age-B occupation period. At Eigenblok site 6, another – yet more certain – funerary monument could be identified that may also predate the Middle Bronze Age-B occupation. This barrow is situated directly east of the house-site(s) at Eigenblok site 6.[20]

All Eigenblok house-sites have yielded outbuildings, although – as at Zijderveld – their numbers differ markedly (between 1 and 17). These outbuildings generally correspond in orientation to that of their nearby farmhouse. The single outbuilding at site 4 (fig. 6.40, C) is the noteworthy exception. The large number of outbuildings that overlap with the ground plans of the houses often (four to six out of seven) show a different orientation than that of the farmhouse. As the others conform reasonably well to the orientation of the farmhouse (see the wind-rose diagrams; fig. 6.42), different orientations may hint at the palimpsest nature of a house-site. No evident preferred location for outbuildings can be suggested, although they occur mostly in the western half of the hypothetical house-sites. One final comment on the orientation of the outbuildings needs to be made. From the wind-rose diagrams it is clear that at house-sites 2 to 6, outbuildings and houses conform to a NW-SE (and perpendicular) axis. At house-site 1, however, several outbuildings conform to the W-E axis of house 1 or a direction perpendicular to it. This correspondence within a house-site and difference in correspondence between house-sites (fig. 6.7), supports the initial VASO assumption that the house may have been conceptually central and was steering the orientation of additional house-site structures (see also section 6.3.12).

In addition to the fences, pits and outbuildings present on most Bronze Age sites, the good feature preservation allowed ard-marks, cattle hoof-imprints and even Bronze Age human footprints to be documented (section 4.3.5; Appendix II). Of these traces, only the human- and cattle hoof-imprints at house-site 5 (fig. 6.40, D) may have been contemporaneous to the farmhouse. The distribution of cattle hoof-imprints seems to be defined by the NW-SE fence-lines to the east of house five. They concentrate near a presumable drinking pool situated there. In the extreme south-east corner of the hypothetical house-site around house five some ard-marks were documented, but these ran at right angles and across the fence-line bundle, suggesting that they belong to another phase (Hielkema, Prangsma & Jongste 2002, 141). As similar ard-marks were observed at house-site 6, where they overlapped and cut-across the features of the structures there (*ibid*., 145), it is more likely that the ard-marks of house-site 5 also post-date the Middle Bronze Age-B occupation period. The same is likely to apply to the cattle-hoof-imprints at house-site 6b, which continue into the ground plan of the house. In any case, the evidence from house-site 5 suggests that cattle could (while grazing or being penned), be found as close-by as 10-15 m from a Bronze Age farmhouse (fig. 6.40, B; D). To sum up the Eigenblok results:

(1) Outbuildings share the orientation of nearby farmhouses.

(2) Fences or bundles of single-type fences conform in orientation to the farmhouses, but are likely to extend beyond the house-sites.

(3) The few pits show no clearly clustered distribution, but predominantly occur in the north and north-west part of the house-sites. They seldom contain many finds.

(4) Outbuildings that overlapped with house ground plans generally had a different orientation, suggesting that orientation and contemporaneity are correlated.

(5) Some fences may have controlled the movement of livestock, but cattle-hoof imprints are found as close-by as 10 to 15 m from a farmhouse.

20 See section 4.3.5 and Appendix II, *cf.* fig. 8.6.

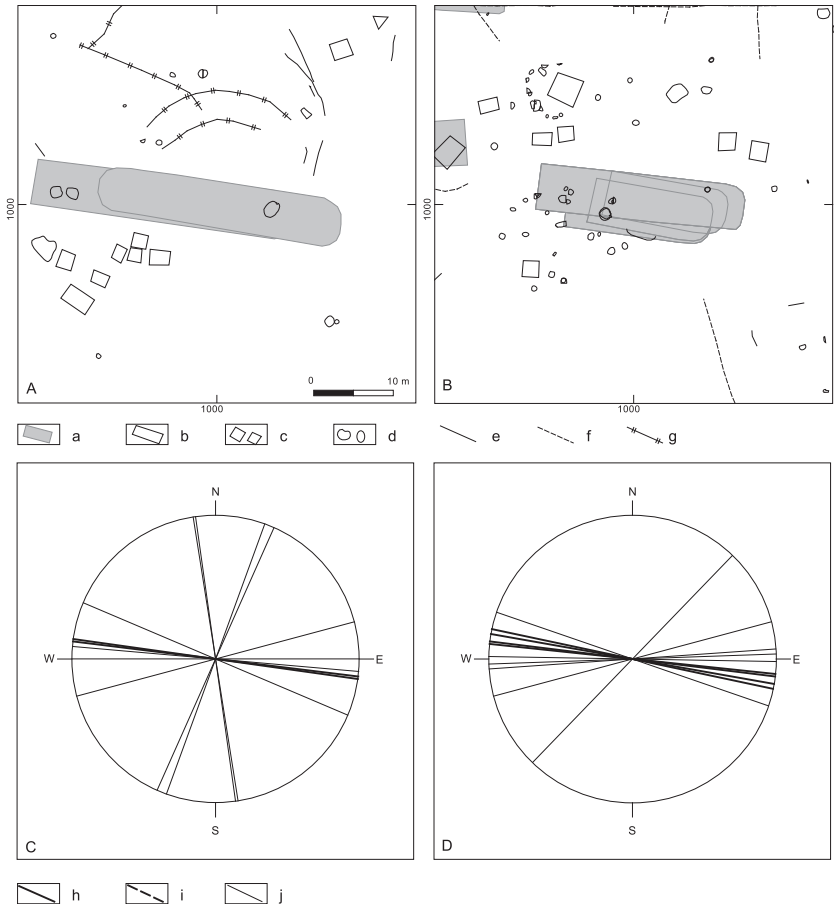


Fig. 6.8 VASO plots towards magnetic north for De Bogen house-sites 29B2/3H (A) and 30B-EH (B) and their wind-rose diagrams (C and D respectively).

a: houses, b: barns/sheds, c: granary-type outbuildings, d: pits, e: type 1a fences, f: type 2 fences, g: palisades or other fence types, h: orientation of houses, i: orientation of barns/sheds, j: orientation of granary-type outbuildings.

6.3.7 De Bogen

At the site Meteren - De Bogen a total of 12 possible Middle Bronze Age-B house-sites could be analyzed with VASO. Of these, one house-site (Bogen 45CH; fig. 6.43, F) yielded only pits and a single fence-line, which reduces applicability. For two other house-sites (Bogen 45DH and Bogen 29AH; fig. 6.43, G; I) I have argued that their central structures are presumably not houses, so these should be treated with extra caution (Chapter 4; Appendix III).

All De Bogen houses are oriented W-E with some (< 20 degrees) variation (see the wind-rose diagram; fig. 6.43, L). That the orientation of the Bronze Age farmhouse was meaningful to a Bronze Age household can be inferred from the observation that where houses were rebuilt, the successors differed only marginally in orientation from the previous buildings (see fig. 6.8).

The number of recognizable stretches of fence at the various De Bogen excavations is relatively low. As postholes of small posts (stakes) were recognized on all sites, it seems unlikely that poor feature preservation can explain the few fence lines recognized. Conversely, the high feature density present in parts of the excavated area may have rendered the recognition of fences difficult. Nonetheless, stretches of fence could be recognized to the east and north-east of De Bogen site 45 and at De Bogen site 30. For all these fences – of which some can be followed for over a hundred meters – two main systems of orientation can be established (see Chapter 4, fig. 4.19). Especially the type-2 fences make up a N-S/E-W system of long, straight fence-lines, whereas another system of WSW-ENE/NNW-SSE fences comprises both type-1a and type-2 fences. Both types sometimes occur together in bundles of fences,

such as at De Bogen site 30. It should be stressed that none of the fence-lines or bundles show any clear-cut spatial relation to the houses (see fig. 6.43, N). Rather, the fences seem to be part of a system that is situated at a spatial scale above that of the house-sites. This is best illustrated at De Bogen site 30, where most fences of the various De Bogen sites could be recognized. There, fences of both systems of orientation can be recognized, but none of these shows any spatial relation (*e.g.* correspondence in orientation, shape) to any of the three undisputable Middle Bronze Age house-sites there (see fig. 6.9, A). Even more so, some smaller stretches of fence seem to overlap with the ground plan of one of the houses. This indicates that not all fences are contemporaneous to the houses and that the fences did presumably not define house-sites but were part of a wider system of land-partitioning.

Several palisades (*i.e.* wide-spaced and narrow-spaced post alignments) could be recognized at the De Bogen sites, of which most were situated on De Bogen site 29 (fig. 6.9, B; e). There, a curvilinear palisade which partly enclosed a *c.* 50 by 100 m part of the floodbasin, was rebuilt and replaced (or was accompanied by) a type- 1a fence (Appendix III, fig. III.28). Near houses 29B2/3H (see fig. 6.8, A), two other curved lines of substantial (*c.* 28 cm diameter) posts placed at 2.1 to 2.3 m apart were found (fig. 6.9, B). To the north, posts with similar dimensions and spacing were placed in line with the WSW-ENE system of fences. In the original publication, these posts were interpreted as the remains of a house ground plan (house 29AH; Hielkema, Brokke & Meijlink 2002, 172), but here an interpretation as two palisade lines is preferred, as the rows of posts continue outside the reconstructed house plan and are structurally similar to the curved palisades discussed earlier (see section 4.4.3 and Appendix III). If the corresponding WSW-ENE orientation of these two parallel, more-or-less straight, palisades to the fences and the ditch cross-cutting house 29B2H indicates contemporaneity, they could all be part of a system of landscape structuring that post-dates the Middle Bronze Age-B occupation period (see section 4.4 and appendix III). For the two curved palisades, their dating is unclear. One posthole contained a single rim-sherd decorated with hollow round impressions that could be (but need not be[21]) dated to the Early Bronze Age or Middle Bronze Age-A. If it is no coincidence that the mean spacing of the posts in the two curved (and the two less reliable angular rows of posts directly to the north of them) is similar to the Middle Bronze Age(-B) houses at that site, these palisades may have been part of the house-site of houses 29B2H and 29B3H. Nonetheless, their function remains enigmatic and their exact dating unclear.

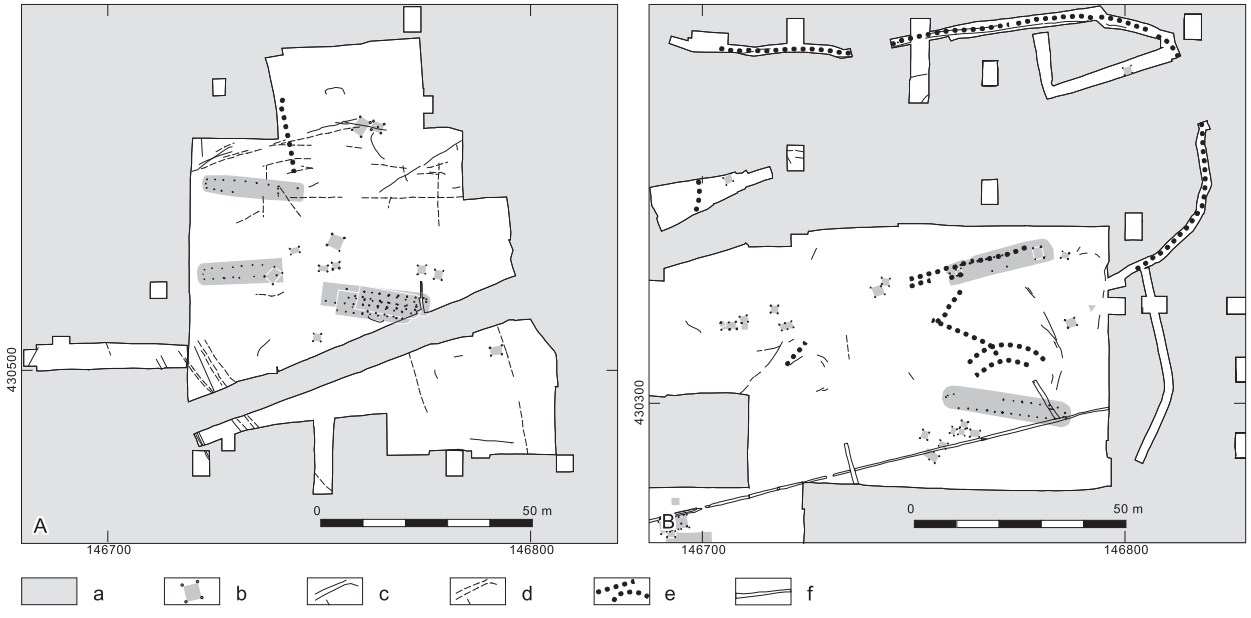


Fig. 6.9 Systems of fences, palisades and ditches at De Bogen sites 30 (A) and 29 (B).
a: not excavated, b: houses and structures, c: type-1a fences, d: type-2 fences, e: palisades, f: ditches.

21 *Cf.* Van Beek 2005, 79; Fontijn, Fokkens & Jansen 2002, 66.

There is no indication for a preferred location of pits in relation to the Middle Bronze Age farmhouses at the various De Bogen sites. The VASO plots show a relatively random (*i.e.* even) distribution of pits deeper than 10 cm around the houses (see fig. 6.10 and 6.43, P). Generally, pits contained no or few (weight < 200 grams) artefacts. Exceptions are the two larger pits overlapping with the ground plan of house 28-4CH (see fig. 6.43, A; Hielkema, Brokke & Meijlink 2002, 278), seven larger pits at site 28-1 (see fig. 6.43, B; *ibid.*, 263), the (grave)pits within the ring-ditches at house-sites 45BH and 45HH (see fig. 6.43, C-D; *ibid.*, 204) and two pits to the west of house 45CH (fig. 6.43, F; *loc. cit.*). At sites 29 and 30, a similar pattern could be documented. Pits generally contained few finds (Hielkema, Brokke & Meijlink 2002, 158; 186) and those that did contain a considerable amount (> 500 g) of finds generally either overlapped with the ground plans of houses or contained datable ceramics which indicated that these may have pre-dated the Middle Bronze Age-B occupation phase. The above observations suggest that pits rich (> 200-500 g) in artefacts were rare for the Middle Bronze Age(-B) occupation phase at De Bogen (fig. 6.10; see also section 5.7). Of the 21 possible refuse pits at the De Bogen house-sites, 13 (*c.* 60 %) presumably predated the Middle Bronze Age occupation phase, five (*c.* 24 %) yielded no datable finds and only three (*c.* 15 %) may date to the Middle Bronze Age(-B) occupation period based on their incorporated finds. As only a handful of possible refuse pits were situated beyond the hypothetical house-sites and the overall number of pits recognized at De Bogen exceeds 400, it is safe to state that at De Bogen, refuse-pits are very infrequent phenomena indeed.[22]

Likewise, wells are rarely found on the hypothetical house-sites of De Bogen. One well could be recognized to the west of house 28-4CH (fig. 6.43, A; Hielkema, Brokke & Meijlink 2002, 288), but yielded no datable finds. At 20-25 m to the west of houses 29B2/3H, a cluster of three wells was discovered of which one could be dated to the last century of the Middle Bronze Age-A and two others to the first three centuries of the Middle Bronze Age-B.[23] At site 30, at 20 m to the west of the house-site of house 30AH, another well dated to the first two centuries of the Middle Bronze Age-B was found next to several Late Neolithic precursors (fig. 4.20; Meijlink 2002a, 47; Hielkema, Brokke & Meijlink 2002, 161). Apparently, wells do occur in clusters – of sometimes remarkable time-depth – but beyond the hypothetical house-sites proper. This distribution of wells is more likely to have been steered by the – above-ground visibility and/or orally transmitted knowledge of – the location of usable aquifers as opposed to any spatial relation to the Bronze Age farmhouse.

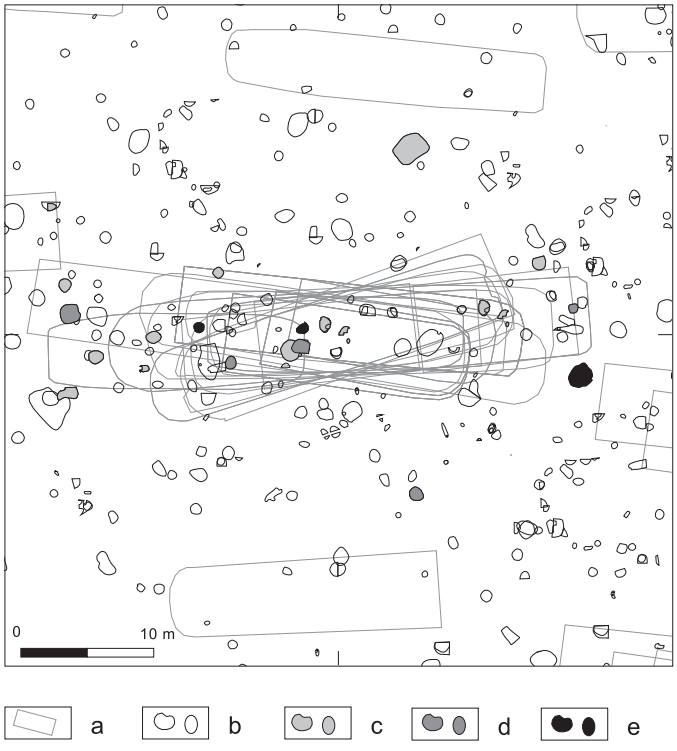


Fig. 6.10 VASO plot towards magnetic north for pits of unknown date, possible pre-MBA refuse pits and possible MBA refuse pits and MBA houses at Meteren-De Bogen.

a: houses, b: pits of unknown date, c: possible refuse pits of unknown date, d: possible pre-MBA refuse pits, e: possible MBA refuse pits.

Although outbuildings can be identified at nearly all hypothetical house-sites at De Bogen, it is not always clear whether they actually ever belonged to the farmsteads of their nearby farmhouses. Especially in the cases where outbuildings overlap (*e.g.* fig. 6.43, E; K) or differ markedly in orientation (*e.g.* fig. 6.43, C-D; I; L, see also above), their contemporaneity may be questioned. Between the extreme examples of house-sites 45CH

22 The total for all periods is 411 (Hielkema, Brokke & Meijlink 2002, 157; 185; 203; 225; 262; 265; 269; 273; 276; 287).
23 See Chapter 4; fig. 4.16, F; fig. 4.17, d; Meijlink 2002a, 47; Hielkema, Brokke & Meijlink 2002, 187.

– within which no outbuilding are found,[24] and house-site 28-1AH[25] – to the north of which a cluster of 11 outbuildings was situated – generally the De Bogen house-sites comprise between two and eight outbuildings. It should, again, be stressed that the contemporaneity of any of these outbuildings is debatable. Nonetheless, there is some evidence – besides a correspondence in orientation – to suggest that these indeed were part of Middle Bronze Age(-B) house-sites. The highest numbers (eight) of outbuildings were documented on sites where the farmhouse was rebuilt, suggesting that this rebuilding of the houses also led to a larger number of outbuildings from an archaeological perspective.[26] Outbuildings were not replaced on the exact same spot, although the cluster of outbuildings north of house 28-1AH may shelter a rebuilt square four-post outbuilding and a rectangular outbuilding that was rebuilt twice (Hielkema, Brokke & Meijlink 2002, 260-262, Appendix III fig. III.22).[27]

No distinct spatial patterns are visible in the VASO plot for houses and outbuildings towards magnetic north nor in the rotated plot (fig. 6.43 and 6.44, O). In both plots, the outbuildings cluster around the farmhouses and roughly (yet far from predominantly) conform in orientation. This less rigid conformity of orientation between outbuildings and farmhouses may be a consequence of the palimpsest nature of this site (*i.e.* outbuildings from other occupation phases have wrongfully been analysed in relation to the Middle Bronze Age(-B) houses; see also Appendix III) or it may simply be that concepts or rules of orientation were less rigidly adhered too at this site.

At De Bogen site 45, a funerary location was discovered that may have been used from the Late Neolithic to the final centuries of the Middle Bronze Age-B, although its phasing has been much debated.[28] It is plausible that the formal monumental phase (*i.e.* a ring-ditch, and possibly a mound body) dates to the Middle Bronze Age-A, so prior to any Middle Bronze Age-B occupation. During the Middle Bronze Age, additional interment and occupation took place on the same spot, but the phasing is unclear.[29] In any case, it demonstrates that the presence of a(n older) funerary plot apparently did not conflict with a (later) use of the same plot for occupation, or *vice versa*. It is perhaps no coincidence that the spacing used in the construction of the 'mortuary house' 45HH is identical to that of ordinary Middle Bronze Age-B farmhouses at De Bogen. The difference between a house for the dead and one for the living could hardly have been smaller.

To conclude, for the sites known as the Bogen, the following statements on the structure of the Middle Bronze Age house-sites can be made:

(1) Houses differ only slightly (< 20 degrees) in orientation from each other, and if houses are rebuild, the difference in orientation is minimal to none, suggesting that house orientation was a meaningful property when a house was rebuilt.

(2) Fences do not surround Bronze Age house-sites, but parcelled the landscape in more or less straight fence lines. At least two different systems of orientation can be outlined for the fence systems. There is some evidence to suggest that fences of different types were part of different orientation systems, but fences of different types also occur together in bundles.

(3) The spacing between posts of some of the palisades is similar to that of the roof-bearing posts of Middle Bronze Age(-B) houses. Possibly, parts of construction schemes for houses and palisades were related.

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24 This house is situated on (*i.e.* is cross-cut by) the excavation limits (see section 4.4, Appendix III or Hielkema, Brokke & Meijlink 2002, 195), which means that once present outbuildings could have been situated to the north of this house.

25 At site 28-1AH it is likely that more house(phase)s were present during the Middle Bronze Age, but they cannot be reconstructed with sufficient certainty (Appendix III, but see Hielkema, Brokke & Meijlink 2002, 249-259). Consequently, the high numbers of outbuildings may be a reflection of multiple house-phases.

26 House(site)s 29B2/3H and 30BH-30EH; fig. 6.43, H; J. Consecutive houses could have had comparable numbers of contemporaneously functioning outbuildings.

27 Possibly, the three almost square four-post outbuildings to the south of houses 29B2/3H (fig. 6.8, A) are also rebuilt instead of contemporaneous, but definitive evidence is lacking (*cf.* fig. 4.16, F; fig. 4.17; Hielkema, Brokke & Meijlink 2002, 171).

28 See Chapter 4, figs. 4.14; 4.21; Appendix III; Hielkema, Brokke & Meijlink 2002, 206-236, Meijlink 2008; Bourgeois & Fontijn 2008.

29 See fig. 4.14; 4.21; Appendix III, esp. figs. III.25; III.34.

(4) A considerable number of pits was found on the hypothetical house-sites, but save for a few exceptions, they contained few finds. Pits that contained over 500 grams of artefacts, mostly contained Late Neolithic to Middle Bronze Age-A ceramics, suggesting that they pre-dated the Middle Bronze Age(-B) occupation period.

(5) The (long-term) clustering of wells suggests that their distribution is based on the presence of useable aquifers and is not related to the location of Middle Bronze Age house(-site)s proper.

(6) Outbuildings mostly – yet not always – conformed in orientation to a nearby farmhouse. The fact that the highest numbers of outbuildings were documented on house-sites with rebuilt houses, indicates that houses and outbuildings may have been considered joint entities (*i.e.* house-site elements).

(7) It was unproblematic for the 'De Bogen' Middle Bronze Age local communities to change the function of a particular plot from a domestic to a funerary location (or *vice versa*). A possible funerary building was constructed which in spacing and span of the posts is similar to the construction scheme used for houses.

6.3.8 Wijk bij Duurstede - De Horden

The houses of the ten presumably Middle Bronze Age-B house-sites of Wijk bij Duurstede - De Horden display a very uniform W-E to somewhat WNW-ESE orientation (figs. 6.46 and 6.48). Possibly, all these houses were once integrated into a system of orientation that was defined or reflected by systems of fences, but no fences have been preserved at De Horden.[30] Although at De Horden Middle Bronze Age houses as much as over 450 m apart share a corresponding orientation (see section 4.5; Appendix IV; Hessing 1991), there were presumably limits to the extent of this system of orientation. The houses of Wijk bij Duurstede - De Geer, situated *c.* 500 m to the north of De Horden, presumably conformed to another (WSW-ENE and perpendicular) system of orientation (see Appendix IV). As there are no direct dates available for the Middle Bronze Age occupation of De Geer and this site has not been published yet in full, it is impossible to decide whether a difference in time or a different social group is reflected by this difference in orientation.

Pits are scarce on the Middle Bronze Age house-sites of De Horden and generally contained few finds (Hessing 1991, 44; Appendix IV).[31] All pits shown on the VASO plots (fig. 6.46 and 6.47, d) are dated to the Middle Bronze Age on stratigraphic grounds. Only for the pit north of house 2 (fig. 6.46, B), charcoal was dated to the Middle Bronze Age-B (Hessing 1991, 42-43; Appendix IV). The ostensible concentration of pits to the north of the houses on the VASO plot (fig. 6.46, I) is predominantly an overrepresentation due to the large number of pits to the north of the long side of house 3 (fig. 6.46, C; see section 4.5.3). To the west of house 1, two larger features – presumably pits – can be dated by stratigraphy to the Bronze Age occupation phase. As the site has not been published in full (see Appendix IV), it is not clear what the exact number, location and content of the Bronze Age pits on this site is.

On all but four house-sites, outbuildings could be recognized. Of these four, one house-site was very fragmentarily preserved (house-site 11) and another largely situated beyond the excavation limits (house-site 12; see section 4.5.3). Only for house(-site)s 6 and 8 were no outbuildings recognized despite the fact that the excavation extents and the feature preservation seemed adequate (Appendix IV). The numbers of outbuildings on the other house-sites varies from one to six. It is noteworthy that house-site 2, which yielded two house-phases, also has the highest number of outbuildings. This suggests that houses and outbuildings were (meaningfully) associated entities (section 4.5.3, esp. fig. 4.26, L). The spatial distribution of the outbuildings in relation to the houses shows two distinct patterns. Firstly, four outbuildings could be reconstructed that overlapped with the ground plans of houses. Considering the low feature densities, this may very well reflect a deliberate decision to interrelate (entwine) notions

30 The fence lines overlapping house 3 as published by Hessing (1991, 45 fig. 4) proved on the original field documentation to be situated on an excavation level above the house and none were encountered at the level of the Bronze Age house. The posts of the palisade to the south of it were visible at one level below that of the house.

31 According to the excavator, wells were altogether absent, but this is compensated for by the presence of open water nearby (Hessing 1991, 44; see also Appendix IV).

of distinct functions through spatial linkage (section 4.5.4). Secondly, all but the two outbuildings east of house 1 (fig. 6.46, A) are situated on the western half of the hypothetical house-sites. This may indicate a general preferred location in relation to the house, but no smaller spatial clusters can be indicated (fig. 6.46 and fig. 6.47, I).

On two Middle Bronze Age house-sites presumable pre-Middle Bronze Age structures were recognized. At house-site 3, a palisade of narrowly spaced larger posts was found to the south of the house. As this palisade became visible at a level below that of the house (indicating the deposition of sediments after palisade construction; *cf.* Hessing & Steenbeek 1990; Appendix IV), its presence on the later Middle Bronze Age house-site is presumably coincidental. House nine was built next to a large ring-ditch that girded the highest parts of the micro-topographic landscape. If this ring-ditch was a (pre-)Bronze Age funerary monument,[32] it can be concluded that it was in any case unproblematic to situate the one (the house) in close proximity to the other (the funerary monument) or *vice versa*.[33] The key elements of house-site structuring at Wijk bij Duurstede can be summarized as follows:

(1) Houses share an (reasonably, *i.e.* < 13 degrees) exact orientation, which is also reflected in the orientation of the outbuildings at all but one house-site.

(2) Pits are an infrequent phenomenon, but can occur clustered on a house-site. The low numbers of finds recovered from these argue against an interpretation as refuse pits.

(3) Generally a few (mean two) outbuildings accompanied houses on house-sites. They are in at all but one case, placed in the western part of the hypothetical house-site. The highest numbers of outbuildings were documented on a house-site that had seen two house-phases, indicating that houses and outbuildings may have been considered joint entities.

(4) Outbuildings could be recognized within the ground plans of four houses. There are slight indications that this may reflect a pattern of erecting granaries on former house(-site) locations.

(5) The close proximity of a funerary location and a house was seen as unproblematic, regardless of order.

6.3.9 Lienden - Kesteren

Several aspects complicate the execution of Bronze Age house-site analysis for the settlement site excavated near Lienden. To start, a critical assessment of the published data (see section 4.6 and Appendix V), has led to the conclusions that the validity of several of the originally published structures (De Voogd & Schoneveld 2002) should be seriously questioned. Instead of five tentative houses, in this study only the two most reliable ones will be dealt with.[34] Secondly, one of these two houses was situated at the excavation limits and could not be uncovered in full, whereas the second of the two most reliable houses was uncovered in a relatively small (*c.* 1000 m^2) continuous excavation surface, which in both cases may have obscured prehistoric house-sites. Thirdly, some re-interpretations have been suggested for some of the other structures at this site,[35] but these are of lower quality than the structures suggested by the original excavators, as they have not been observed and checked during fieldwork. Nonetheless, some observations on the structure of the Lienden Bronze Age house-sites can be made.

Two reasonably comparable Middle Bronze Age(-B?) houses could be reconstructed which were both roughly orientated (W)NW-(E)SE. In the vicinity of these houses, some outbuildings were found that conformed to them in orientation, or were oriented at right angles to them (fig. 6.50). If only the structures recognized by the excavators are incorporated (fig. 6.49, C), it can be noted that the distances between the outbuildings and the houses are somewhat larger than with the other Bronze Age sites. If, however, the postholes originally published as a four-aisled outbuilding directly north-east of house D (De Voogd & Schoneveld 2002, 61) are re-interpreted as several

32 For a discussion see Appendix IV and Hessing 1989; see also fig. 4.28.
33 *Cf.* sections 6.3.7 and 6.3.8. For barrow – house interrelations see Bourgeois & Arnoldussen 2006; Bourgeois & Fontijn 2008.
34 See section 4.6; Appendix V, esp. fig. V.16 and V.18.
35 Appendix V, esp. fig. V.16 and V.18.

four-post outbuildings (Appendix V, fig. V.16), a pattern not unlike that at other Middle Bronze Age sites comes to the fore.[36]

The feature preservation at Lienden was moderate, therefore more shallow traces such as fence-lines, hoof-imprints or ard-marks had not been preserved. Of the sixty pits recognized, over 24 contained large amounts of artefacts.[37] This is a markedly different situation compared to (the contents of the pits at) the other sites discussed above. The presence of pits containing over 2 kg of artefacts, may indicate a (secondary) function as refuse pits. Unfortunately, the strategy used for the analysis of the ceramics (Ufkes 2002a, 81-82) renders it impossible to make an adequate interpretation of these pits. For the 22 suspected refuse pits at Lienden site 15, which contained 1989 sherds (weighing over 8 kg), only seven (!) sherds (weighing 107.9 g) have been studied in detail. The pit-contents have thus not been studied as interesting assemblages in themselves, which means that even basic information such as the minimum number of vessels present within them is lacking. Although the four pits to the west of house P (fig. 6.49, B) all contained many finds (> 500 g), these pits appear to be part of a wider – and moderately even – spread along the higher parts of the crevasse micro-topography and show no evident spatial relation (*e.g.* clustering) near recognized structures.[38]

No additional possible house-site elements (*e.g.* fences, wells, palisades) have been recognized at Lienden, which means that only the interrelations between houses, outbuildings and pits could be analyzed. The conclusions can be summarized as follows:

(1) The two houses that could reliably be reconstructed at Lienden are orientated reasonably (< 20 degrees) similarly in a NWN-ESE direction.

(2) Some outbuildings with a comparable (or perpendicular) orientation can be found between 7 to 20 m from the house, but – if tentative outbuildings are included – also at closer distance.

(3) Some pits, containing few as well as many (> 500 g) artefacts, can be found on hypothetical house-sites. The distribution of the pits richest in weight of artefacts recovered, suggests that they show no evident spatial relationship to Middle Bronze Age house(site)s, but are part of a moderately even distribution at a larger spatial scale (possibly related to the higher zones of the micro-topographic landscape).

6.3.10 Dodewaard

Analyses of the house-site structuring of the Middle Bronze Age house-sites at Dodewaard are complicated by the high overall feature density (obscuring structures and their constructional histories) as well as the close proximity of the house(phase)s reconstructed, making it impossible to assume – based on proximity – which outbuildings are more likely to belong to what house-site.

At Dodewaard, the orientation of houses and outbuildings is likely to have been a significant property upon construction. The three (possibly four; see Appendix VI) house phases are all accurately (< 15 degrees) oriented midway between NNW-SSE and NW-SE. All but one of the outbuildings on the house-sites of these house(phase)s conform to this preferred orientation (fig. 6.51 and fig. 6.53). The larger outbuilding between house(phase)s 1a/b and 2 is – presumably not coincidentally – placed at a nearly perfect right angle to the main axis of orientation.

A large number of fences-lines could be reconstructed from the Dodewaard excavation plan (fig 6.11, A; Theunissen & Hulst 1999a, 140 fig. 4.11) and the large numbers of yet unassigned stakes indicate that several more were present in prehistory. Only a few fence-lines correspond in orientation to the houses and outbuildings. Furthermore, several fence-lines overlap with house-phases 1a/b. The diversity in orientation and overlap with the location of the houses suggests that not all fences were contemporary to the houses. In the west part of the Dodewaard

36 In this reconstruction, two of these tentative outbuildings overlap and one may be classified as a rebuilt granary. As this concerns post-excavation reconstructions, they are not discussed in the body text.
37 A total of 12 pits contained over 500 g, another 12 contained over 1 kg of artefacts (De Voogd & Schoneveld 2002, 76-80; see Appendix V, fig. V.20).
38 Compare Appendix V, figs. V.22, C to fig. V.20.

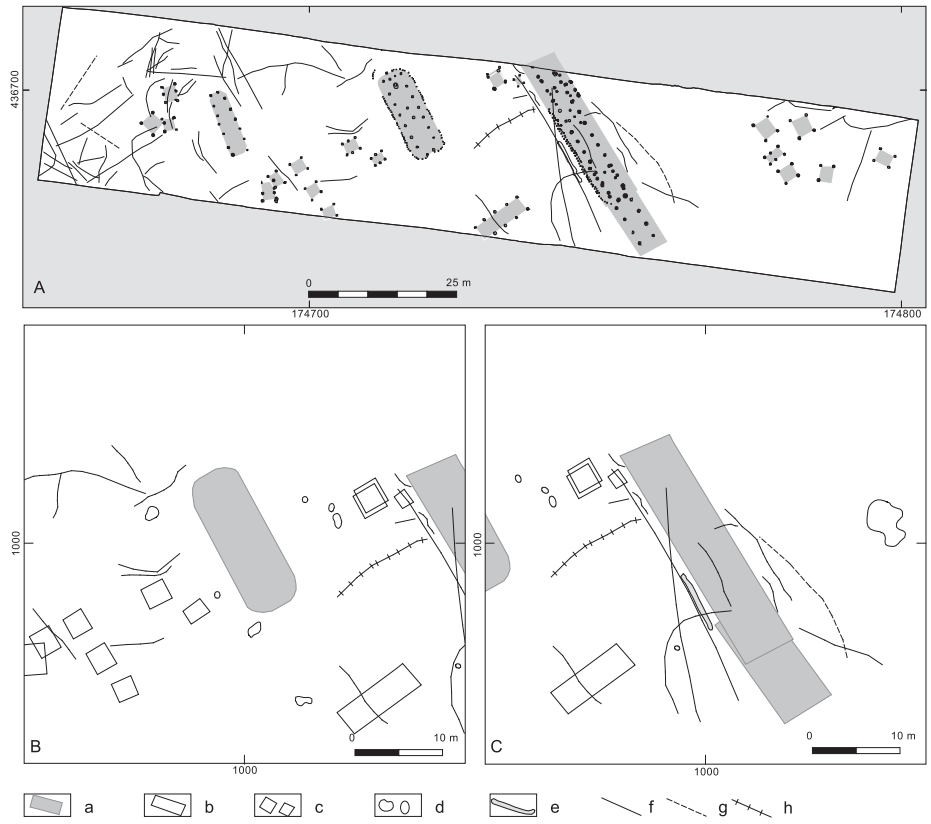


Fig. 6.11 Overview of fences and structures at Dodewaard (A) and VASO plots towards magnetic north for house-phases 1a/b (B) and 2 (C).

a: houses, b: barn/shed types of outbuildings, c: granary-type outbuildings, d: pits, e: fences, g: type-1a fences, f: type-2 fences, g: fences of other types.

excavation, some fence-lines (enclosing a rectangular area?) that share an almost N-S/E-W system of orientation can be identified (fig. 6.11, A). This orientation is also found with one outbuilding in the east of the excavated area. Both possibly belonged to another phase of landscape structuring, either preceding or following the main Middle Bronze Age(-B) occupation phase.[39] Hardly any of the smaller and curvilinear shaped fences can be grouped with either system of orientation.

Several outbuildings can be found in the direct (< 5-10 m) vicinity of the Middle Bronze Age farmhouses, as well as at larger distances. Possibly, outbuildings were preferably erected to the west of the farmhouses, as no outbuildings are situated to the immediate (< 22 m) east of house-phases 1a/b and several are found to the west of house 2. For three house-phases, a total of 22 outbuildings are known, suggesting that multiple outbuildings were once part of single prehistoric house-sites. One six- and one four-post outbuilding have been rebuilt on the exact same spot with the same dimensions and orientation, indicating that location, size and orientation were important properties of outbuildings. There are slight indications that the variation of orientation of outbuildings increases with the distance from the presently recognized houses, but the limited extent of the present excavation weakens the reliability of this observation (*i.e.* outbuildings with a deviant orientation may have corresponded in orientation to houses situated (just) beyond the excavation limits).

A limited number of pits are situated within the hypothetical house-sites (fig. 6.11, B-C; Theunissen & Hulst 1999a, 148). As they generally contained few finds, it can only be assumed that some of them are Middle Bronze Age in date (*opus cit.*, *cf.* Bulten 1997, 13; 1998c, 22). For two pits, the ceramics and lithics recovered from them – and in one case a radiocarbon date – suggest that they pre-date the Middle Bronze Age-B occupation period (Theunissen

39 But see Appendix V on presumed Late Bronze Age activities at Dodewaard.

& Hulst 1999a, 139). No features that could be interpreted as wells or drinking pools have been published and such features were presumably absent. Consequently, statements on the house-site structuring of the Middle Bronze Age(-B) houses at Dodewaard predominantly concern house-outbuilding interrelations:

(1) The three clearly identifiable house-phases at Dodewaard correspond well (< 15 degrees) in orientation.

(2) This system of orientation is also reflected in the orientation of the outbuildings, that are orientated parallel and occasionally perpendicular to the long axes of the houses. Possibly, the outbuildings were preferentially placed west of the houses.

(3) Some outbuildings are rebuilt on the exact same spot with the same dimensions and orientation, suggesting that location, size and orientation were important properties of outbuildings and that these properties were maintained when the outbuildings were rebuilt.

(4) Some of the (predominantly type-1) fences concur with the system of orientation set by the houses and outbuildings, but they by no means seem to define individual house-sites. Several stretches of curvilinear fence have deviating orientations and some overlap with the ground plans of Middle Bronze Age structures. Presumably, several occupation phases are reflected in the fence systems.

(5) Few pits (and no wells) are present, generally with few finds.

6.3.11 Tiel - Medel 8

The data from the excavations at Tiel - Medel 8 are incorporated in this chapter because at this site several house-phases datable to the Middle Bronze Age-B, as well as some house-sites dateable to the Late Bronze Age have been uncovered (Van Hoof & Jongste 2007). Consequently, the data set for the Middle Bronze Age(-B) under discussion increases in size with six to seven additional house-sites, but also a comparison between the house-site structuring of the Middle Bronze Age(-B) and Late Bronze Age periods becomes possible.

For the Middle Bronze Age(-B), six or seven house-sites have been recognized (Van Hoof & Jongste 2007). The inexactness of the count is a consequence of the close proximity of some of the houses to each other, making it difficult to decide whether they represent rebuilt or overbuilt houses on a single house-site or, alternatively, separate house-sites at close proximity. One house-site may have seen three house-phases (fig. 6.54, A; B; H), whereas another had at least two house phases (fig. 6.54, F; G). The eight Middle Bronze Age(-B) house(phase)s of Tiel - Medel 8 have two main preferred axes: either slightly southwest of an east-west axis, or alternatively slightly northwest of a north-south axis. Accordingly, the VASO plot toward magnetic north shows that these house axes are nearly perfectly (< 10 degrees) perpendicular to each other (see fig. 6.54, I and fig. 6.55). Only house 3 deviates somewhat from these axes, as it is orientated NNW-SSE (fig. 6.12, C; fig. 6.54, D).

Although some stretches of fence have been recognized for the Middle Bronze Age(-B) occupation phase at Medel 8, they can not be associated with particular house-sites (Van Hoof & Jongste 2007, 55-56). To the south of house(phase)s 5, 6 and 7, a palisade of wide-spaced (*c*. 1.4-1.8 m apart) posts (*c*. 10-20 cm diameter) could be followed for over 55 m. The orientation of this palisade fits well within the schemes laid out by the houses, as it is also slightly southwest of an east-west axis. Beyond the confines of the hypothetical house-sites, at *c*. 25-55 m to the south of house(phase) 6, three fences lines with a comparable orientation but consisting of type-1b and/or type-2 stake arrangements were discovered (*loc. cit*.). These too could be followed for moderately large (> 60 m) distances and evidently did not define individual house-sites. According to the excavator, these four fence-lines may have delimited the settlement site as a whole, rather than individual house-sites (Van Hoof & Jongste 2007, 55).

Outbuildings are found at all house-sites, and slight differences in orientation between outbuildings for the different house(phase)s indicate that the orientation of the outbuildings was presumably based on that of the houses. Note that the outbuilding to the west of the – slightly differently orientated – house 3 also shows a deviant orientation, yet matching that of house 3 (fig. 6.12, B; C). A similar interpretation may be forwarded for the outbuilding situated where houses 8 and 1a overlap. The orientation of this outbuilding matches that of house 8 better than it does that of

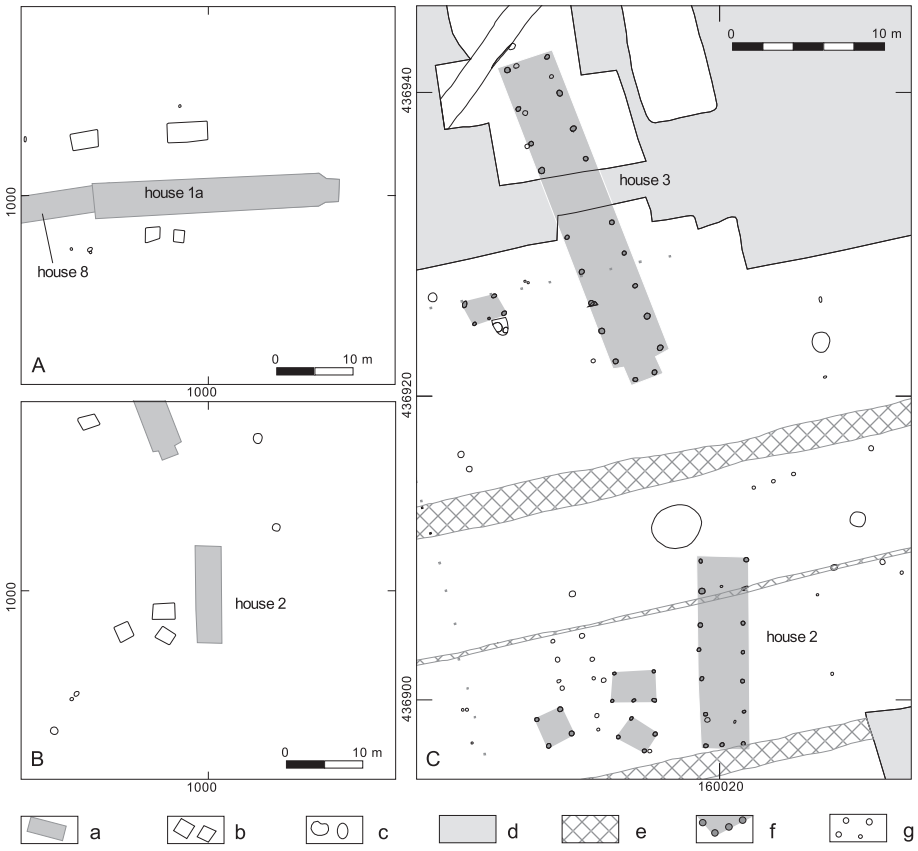


Fig. 6.12 VASO plots towards magnetic north for house(phase)s 1b (A) and 2 (B) and cut-out from the excavation plan near houses 2 and 3 (C).

a: houses, b: outbuildings, c: pits, d: not excavated, e: recently disturbed, f: houses and structures, g: other features.

house 1a (fig. 6.12, A). Another important observation is the fact that a rare (*cf.* fig. 5.39) five-post rectangular type of outbuilding was situated west of the long-sides of both house 2 and house 3 (fig. 6.12, C). Possibly, this should be interpreted as a repetition (*i.e.* 'cloning') of a preferred outbuilding location (*i.e.* house-site structuring) upon relocation of the house(site).

The number of outbuildings on the hypothetical house-sites varies, but ranges from one to five and may be two to possibly three mean per house. The highest number of outbuildings is situated between houses 6 and 7 and house 5, and presumably reflects a minimum number of outbuildings for these three house-phases (n = 5; fig. 6.54, E-G). Many more postholes were found near the reconstructed outbuildings, but they could no longer be grouped into individual structures. There are weak indications that outbuildings may have preferably been situated west of the farmhouses, as this is the location of the outbuildings at house-sites 1-3 and 5 (fig. 6.54, A-E). This is however weakened by the fact that at house-site 8 an outbuilding was presumably situated east of the farmhouse (fig. 6.12, A) and that no outbuildings were recognized west of (overlapping) houses 6 and 7 (fig. 6.54, F-G).

The VASO plot for all Middle Bronze Age house-sites towards magnetic north (fig. 6.13, A), shows that outbuildings have a wide and multi-axial distribution. The VASO plot with all Middle Bronze Age houses orientated NW-SE shows a different pattern; now the distribution of the outbuildings is best described as two elongated zones next to the long sides of the houses (fig. 6.13, B). This radical change in the distribution of the outbuildings in relation to the houses, is proof of the correctness of the assumption that the placement of these outbuildings was indeed based on properties such as the orientation of their nearby farmhouses. Consequently, the distribution of the Tiel outbuildings is best described as 'being situated near the long sides of the farmhouses, with corresponding or perpendicular orientation' as opposed to a description based or their location in a system of cardinal directions.

Fig. 6.13 VASO plots for all house-site elements of the Tiel-Medel 8 MBA(-B) house-sites towards magnetic north (A) and rotated to NW-SE (B).

a: houses, b: undated or LBA houses, c: barn-shed types of outbuildings, d: granary-types of outbuildings, e: pits, f: wells, g: type-2 fences, h: other types of fences, i: interpretation of the distribution of the outbuildings.

A few pits are present on most of the hypothetical house-sites, but due to younger Late Bronze Age occupation at this site, it is not always clear whether these pits belonged to the Middle Bronze Age occupation phase. Regardless of their dating, only a small portion (*c.* 14 %; 14 out of 102 pits; Van Hoof & Jongste 2007 and original documentation) contained many (> 500 g) artefacts. Of these, only three are situated on a hypothetical Middle Bronze Age house-site (the two largest pits and the pit overlapping houses 6/7 on house-site 5; fig. 6.54, E). These pits contained some sherds datable to the Middle Bronze Age-B, but most of their contents (maximum 700 g) in weight concerned animal bones. The generally low content of the pits in weight would argue against a (secondary) function as refuse pits. Nonetheless, a cluster of pits predominantly datable to the Middle Bronze Age that were all relatively rich (540-2783 g) in artefacts is known from Tiel - Medel 8. It concerns a pit cluster situated to the north-west of house-site 3 (Van Hoof & Jongste 2007, 67-78 fig. 5.15). Possibly, the pit visible in the north-west of house-site 3 formed the south-easternmost pit of this cluster (fig. 6.54, D).

Two wells were recorded on the hypothetical house-site of house 8 (fig. 6.54, H) and a possible well or drinking pool at house-site(s) 6/7. The westernmost well at house-site 8 was radiocarbon dated to the Middle Bronze Age-B, the other yielded no datable finds (De Leeuwe & Van Hoof 2007). The pit at house-site 6/7 contained some sherds datable to the Middle Bronze Age-B (*ibid*.). Their locations in relation to the houses might suggest that the wells were preferably located to the west of the farmhouses, but this pattern is distorted by the small size of the hypothetical house-sites. In reality, the wells at house-site 8 are part of a cluster of wells of which may have been re-used during the Late Bronze Age, and another is likely to have been dug during this period (*loc. cit.*). This mimics the situation at De Bogen (see section 6.3.8), where wells dating from multiple periods were situated in a small cluster. This could indicate that it was the presence of (above-ground visibile indicators of?) usable aquifers that may have steered the locations where wells were dug. In addition, two other possible Middle Bronze Age wells are situated 8 m apart at *c.* 70 m to the WSW of house 8. As they are situated near the excavation limits, no comments can be made on whether they were ever situated near a Middle Bronze Age farmhouse (Van Hoof & Jongste 2007). In short, wells could be situated as close by as 10-20 m from a Middle Bronze Age farmhouse, but may alternatively also be situated at quite large distances away.

At this point, it is fruitful to briefly consider the data for the Late Bronze Age occupation at Tiel - Medel 8. A total of seven structures have been interpreted as possible Late Bronze Age houses (Van Hoof & Jongste 2007, 38-43). Of these seven, houses 4, 9, 10 and 12 had been recognized during the fieldwork and are most likely to be Late Bronze Age structures (fig. 6.57, A-C; E; Van Hoof & Jongste 2007). For house 10, a radiocarbon date confirmed the Late Bronze Age date attributed on the basis of the ceramics from the pits in its southern aisle (fig. 5.30, no 2; fig. 6.57, C; Arnoldussen & Ball 2007). The orientation of the possible Late Bronze Age larger structures conforms to two axes, which are not perpendicular to each other. Possible houses 4, 9 and 10 are roughly (< 20 degrees) orientated E-W, whereas possible houses 11 to 13 are orientated SSW-NNE (fig. 6.56, I). This presence of multiple (non-perpendicular) axes of orientation is not documented for the Middle Bronze Age sites from the Dutch river area.

Additionally, only few of the outbuildings that surround the possible Late Bronze Age houses conform in orientation to the nearby structures (fig. 6.57, I and fig. 6.58, I). Furthermore, the number of outbuildings accompanying the farmhouses seems higher, even if compensated for the close proximity of possible houses 10 to 14 to each other (over four outbuildings mean per house). The VASO plot for the Late Bronze Age houses consequently shows a wide and dense scatter of outbuildings (fig. 6.57, H-I), that does not improve in clarity upon rotation towards NW-SE (fig. 6.58 H-I). So unlike with the Middle Bronze Age(-B) house-sites, the orientation of the farmhouse seems not to have (as strongly) determined the place and orientation of outbuildings in the Late Bronze Age. This again suggests that the conformity in orientation between outbuildings and farmhouses was a deliberate and meaningful aspect of house-site structuring during the Middle Bronze Age-B period. To sum up the conclusions for Tiel - Medel 8:

(1) All but one of the Middle Bronze Age(-B) houses of Tiel - Medel 8 conformed to a single (bi-axial, perpendicular) system of farmhouse orientation.

(2) The Middle Bronze Age houses were generally accompanied by few (*c.* 2) outbuildings, which as a rule, have a similar orientation as the nearby farmhouse. A different orientation of the farmhouse influenced that of the outbuildings next to it.

(3) For the Middle Bronze Age(-B) houses at Tiel - Medel 8, the preferred location of outbuildings is best described as 'next to the long sides of the houses', regardless of the cardinal orientation of the house.

(4) The construction of a specific type of outbuilding in a particular location in relation to two (differently orientated) farmhouses, reinforces the interpretation that outbuildings and farmhouses formed (conceptual) unities.

(5) This unity of farmhouse and outbuildings for the Middle Bronze Age(-B) as exemplified in points (3) and (4) is absent in the (hypothetical) houses-sites for the Late Bronze Age period. This indicates that the patterns observed are not artefacts of the (VASO) methodology applied, but that they reflect veritable Middle Bronze Age-B decision-making with regard to the structure of Middle Bronze Age-B farmsteads.

6.4 Common grounds? A comparison of the VASO results

Having discussed the results of the VASO analyses of the individual Middle Bronze Age settlement sites above in section 6.3, it is now possible to compare the individual results. If similar patterns are found for different sites, this could indicate that some house-site structuring 'rules' were shared or adhered to at a supra-local level. Conversely, deviating patterns could indicate which aspects of house-site structuring were susceptible to local variation. A schematic summary of the main outcomes of the VASO analyses for the different Middle Bronze Age settlement sites is depicted as figure 6.14.

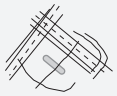
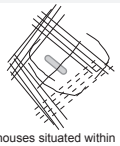
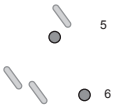
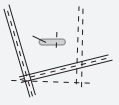
	Houses	Outbuildings	Fences	Pits	Wells	Graves	Other
Zijderveld				few mostly north of houses? all contain < 200 g	two mostly north or northwest of houses?	n.a.	n.a.
	WSW-ENE + perpendicular none rebuilt	n > 3 < 38 mean *c.* 3 to 6 > six rebuilt orientation same as houses	houses situated in corners of larger systems of fences? bundles comprising different types some overlap houses often orientation like houses				
Eigenblok				few often overlap houses all but three contain < 600 g one refuse pit?	one nw of house		n.a.
	NW-SE one W-E one rebuilt	n > 1 < 18 mean *c.* 5 to 8 none rebuilt orientation same as houses of overlapping with houses, they have an other orientation	houses situated within larger systems of fences? some bundles of single types some overlap houses often orientation like houses for control of livestock?			one pre-MBA grave at house-site 5, not overbuilt (respected?) one pre-MBA grave, next to house-site 6 respected or even preferred location ?	
De Bogen				many (n > 400) of which only 21 on house-sites generally few finds rich pits often overlap houses or pre-date houses only 3 to 8 possible MBA refuse pits	four, one on house-site w of houses? three dated wells clustered clusters of wells with large time-depth		pre- and post-MBA(-B) palisades
	roughly W-E one rebuilt one rebuilt twice	n = 0 < 11 mean *c.* 3-5 highest at multi-period house-site two possible re-built clusters orientation ± same as houses	few, some overlap NS-EW system of type 2 WSW-ENE/NNW-SSE system of mixed types houses within larger systems of fences			one pre-MBA grave at site 45, possibly funerary house and overbuilt by house also again MBA / LBA burials	
Wijk bij Duurstede			n.a.	few cluster at one house-site single pit at one house-site contained few finds north of houses?	n.a.		pre-MBA(-B) palisade
	W - E (WNW-ESE) one rebuilt two possibly rebuilt on same house-site	n = 0 < 6 mean *c.* 2 highest at multi-period house-site generally west of houses orientation same as houses, none rebuilt				one undated funerary monument, house and outbuildings close-by respected or even preferred location ?	
Lienden			n.a.	many (n > 60) many rich (> 500 g) pits (n > 24) distribution of refuse pits related to micro-topography landscape?	n.a.	n.a.	n.a.
	(W)NW-(E)SE none rebuilt	n = 2 (< 11 ?) mean *c.* 2 tentative cluster of rebuilt outbuildings more distant (10-20 m) from houses? orientation same as houses					

Fig. 6.14 Schematic overview of the VASO results for the different sites (vertical axis) for different house-site elements (horizontal axis). The filled areas in the outbuildings column indicate the generalized main distribution (light fill) and denser concentrations (dark fill). The different line-types in the fences column indicate different fence types.

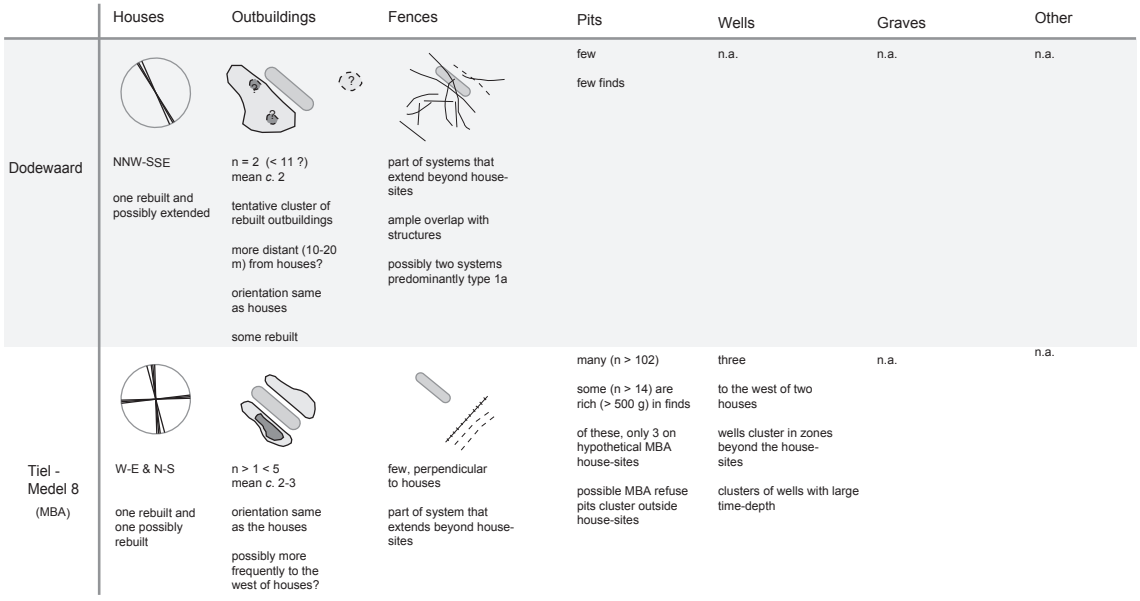


Fig. 6.14 (continued) Schematic overview of the VASO results for the different sites (vertical axis) for different house-site elements (horizontal axis). The filled areas in the outbuildings column indicate the generalized main distribution (light fill) and denser concentrations (dark fill). The different line-types in the fences column indicate different fence types.

6.4.1 The defining role of the orientation of the houses

One of the most clear conclusions is that the Middle Bronze Age farmhouses at all sites conform to a single (mono- or bi-axial) system of orientation. In the case of the settlement sites Meteren - De Bogen, Wijk bij Duurstede - De Horden, Lienden and Dodewaard, the system of orientation is mono-axial. The deviation from the mean orientation is smaller than 20 degrees, but typically much less. Only at Eigenblok was a single farmhouse orientated more than 40 degrees of the mean orientation for all houses at that site. If we ignore this single outlier, Rumpt - Eigenblok could also be classified as mono-axial. At the settlement sites of Zijderveld and Tiel - Medel 8, the system of orientation represented by the Middle Bronze Age houses should be labelled bi-axial. At Zijderveld a single house and at Tiel three houses are orientated at an angle perpendicular to that of the other houses. Assuming that the concept of 'at a right angle' had any validity for Bronze Age people, this can be interpreted as a different form of respecting the system of orientation. The documented placement of larger (*e.g.* six-post and barn/shed types of) outbuildings with their long axis perpendicular to that of the farmhouses,[40] does suggest that this 'right-angle' concept did indeed hold significance for Bronze Age farmers.

In the absence of well-dated houses, the correspondence between accordance in orientation and contemporaneity of houses cannot be proven, but is likely to have been strong. The fact that houses, even if not contemporaneous, were built with a similar orientation testifies to intentions to conform to – and in any case not disrupt – pre- or coexistent systems of orientation (Arnoldussen & Fontijn 2006, 296). This system of orientation need not, however, have relied (solely) on the houses. Especially the orientation of systems of fences may also, or alternatively, have steered corresponding orientation of multiple houses. If such houses with a corresponding orientation were indeed contemporaneous in prehistory, the shared orientation of houses within a cluster ('settlement'?, see Chapter 3) may be a reflection and indication of a distinct social group, such as a kin group, neighbourhood or other social conglomerate.[41]

40 *E.g.* Zijderveld house(-site) 1 (section 4.2.3; Appendix I), De Horden house(-site)s 1 and 3 (section 4.5.3; Appendix IV), Dodewaard house(-site) 2 (section 4.7; Appendix VI). In addition, several rectangular four-post structures may have been orientated perpendicular to farmhouses, but as the boundary between square and rectangular is debatable, they have been omitted here. See also the bi-axial (perpendicular) distribution of outbuildings in fig. 6.16.

41 *Cf.* Kok 2002, 119 on similar ideas on the significance of orientation with Iron Age houses at Oss.

In this light, it is important to note that Eigenblok and De Bogen have distinctly different axes of house-orientation (fig. 6.15), while the settlement sites were only 4.2 km apart in prehistory (*cf.* fig. 1.6). Consequently, the validity of the prevailing wind-direction as steering the orientation of the houses, as proposed by the excavators, must be challenged (*contra* Jongste 2002b, 610). It is unlikely that at such close proximity, the prevailing wind direction will have differed by forty degrees. Rather, the difference in orientation should be interpreted as a meaningful property of the houses, which was important to their inhabitants.[42] For the importance of house orientation in general, as conforming to or expressing social and/or cosmological rules, several anthropological examples are known.[43] This point will be dealt with again when fences are discussed (section 6.4.3).

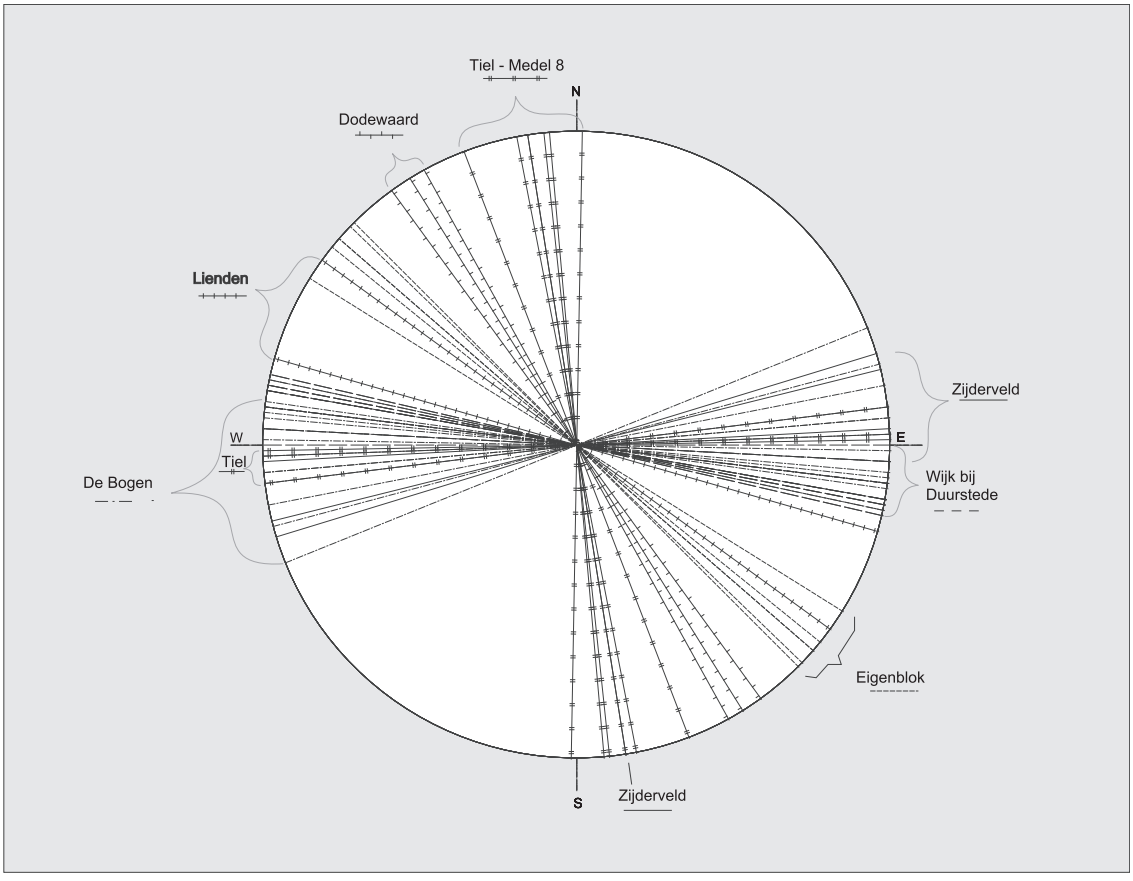


Fig. 6.15 Wind-rose diagram for the MBA(-B) houses at the seven settlement sites discussed in this chapter.

A diagram of the orientation of the Middle Bronze Age(-B) farmhouses at the seven sites analysed in this chapter, indicates that at several settlement sites, different orientations were preferred (fig. 6.15). The orientation of the houses from Dodewaard, Lienden, Eigenblok and the N-S orientated houses of Tiel hardly overlap with houses from other sites. The W-E houses of Tiel form a subset within the predominantly W-E array of houses at De Bogen. If the

42 Streiffert (2005, esp. 3) was also able to outline different traditions in house-building techniques at the settlement site level for Middle Bronze Age houses in Halland, Sweden.

43 *E.g.* Levi-Strauss (1955(2004), 242; 256), Cunningham (1973, 205-207), Rigby (1973, 264), Sahlins (1976, 33, esp. note 26), Turton (1978, 144-118), Kus & Raharijaona (1990, 23-28), Fox (1993a, esp. 14-15), Blier (1995, esp. 27-28), Carsten & Hugh-Jones (1995, 37 esp. note 28), Strathern & Stewart (2000, 236-237). For a discussion of orientation in relation to Swedish Bronze Age houses see Gröhn 2004, 323.

De Bogen houses are left out, the Zijderveld and Wijk bij Duurstede houses that are also roughly oriented W-E, also form two relatively distinct clusters.

Despite the overlapping W-E distributions, the presence of distinct groups may hint at a deliberately chosen system of orientation. As important, the direction SW-NE is conspicuously absent. As there are no evident reasons (besides cosmological or social ones) why houses could not have been built with a SW-NE orientation, it is proposed here that it was simply considered inappropriate to construct houses with that orientation in this region (*i.e.* it was irreconcilable with cosmological views).[44]

6.4.2 Outbuildings and their relations to farmhouses

How many outbuildings were present at a house-site?

At all Bronze Age settlement sites outbuildings were discovered in the vicinity of Middle Bronze Age farmhouses. Yet, this does not imply that every house was surrounded by outbuildings in the past. At De Bogen (fig. 6.43, F) and De Horden (section 4.5.3; Appendix IV), no outbuildings could be identified within some hypothetical house-sites. In addition, on some settlement sites the close proximity of house(phase)s and outbuildings made it difficult to determine which outbuilding was formerly part of which house-site (*e.g.* De Bogen site 30: ten outbuildings for six house phases; Appendix III). Yet, by and large, outbuildings are frequent if not almost invariable companions to farmhouses. Estimates for the mean maximum numbers of outbuildings per house(-site) for all Middle Bronze Age house-sites in the Dutch river area, range between two and eight, and are three to four mean.[45]

Between two to four outbuildings seems an acceptable common denominator for a 'generic' Middle Bronze Age(-B) house-site in the river area. Where higher numbers were documented, this frequently entails a house-site with multiple house phases,[46] or house-sites that are suspected to have been re-used in (or remained in use into) younger periods.[47] In the latter case, overlap between the house ground plan and some of the outbuildings was frequent. It may be significant that the highest numbers of outbuildings were documented on house-sites of relatively large farmhouses.[48] Perhaps with these larger houses more storage facilities (see section 5.4) – due to a higher number of human or animal occupants? – were deemed necessary. In addition, or alternatively, it could be that the length of the farmhouse as well as the number of accompanying outbuildings provided media through which social statuses could be claimed and demonstrated by the household or local community.[49] It should be stressed, however, that no simplistic correlation between farmhouse size (or outbuilding numbers) and social prestige may be inferred.[50]

How are the outbuildings distributed?

Having gained some insight into the *numbers* of outbuildings commonly present at Middle Bronze Age(-B) house-sites, some comment on their *distribution* should be made. In figure 6.14, the distribution of outbuildings as suggested by the VASO plots for the different sites, is represented schematically. Locations where clustering (either on single house-sites, or as a result of overlay) was observed are indicated in a darker shaded fill. At all sites, outbuildings are found close (within 5-15 m) to the farmhouses, indicating that they clustered around the farmhouses. Only at Lienden were no undisputable outbuildings reconstructed in the direct vicinity of the farmhouses. A second characteristic of

44 This avoidance of the general SW-NE direction also applies to other areas of the Netherlands during the Middle Bronze Age-B.
45 Based on the numbers of outbuildings on the house-sites per settlement site, and for all settlement sites together (figs. 6.37 to 6.55).
46 *E.g.* Eigenblok house-site 2 (fig. 6.40, B), De Bogen house-sites 28-1, 29B2/3H and 30BH-EH (fig. 6.43, B; H; J), De Horden house-site 2 (fig. 6.46 , B).
47 *E.g.* Zijderveld house-site 1 (fig. 6.37, A), Eigenblok house-site 1 (fig. 6.40, A).
48 Eigenblok house 5: 22 m, De Bogen house 29B2h: 25 m; Zijderveld house 1 (reconstructed): 26 m, Zijderveld house 3: 29 m.
49 For anthropological examples of social prestige or status related to house size see: Thompson 1940, 160-161; Denyer 1978, 21; Kramer 1979; Hayden & Cannon 1982, 138; Sajor 1999, 24; Howell 1995, 155-156; Miller 1997, 5; Marshall 2000, 96; Vellinga 2000, 258-259; Heckenberger 2005, 257, see also Wason 1994, chapter 7, concerning granaries see Malinowski 1935, 229; 242; Edelman 1943b, 142; Pélissier 1966, 709; Hill 1972, 254; Rosaldo 1980, 4; 132-134; 167; Domenig 2003, 196-197.
50 *Cf.* Waterbolk 1964, 122; Therkorn 1986, 33; Louwe Kooijmans 1993c, 17; Harsema 1997b, 91; Earle 1997, 30; 31; 61; 2001, 114; Kristiansen & Larson 2005, 277-278, *cf.* section 8.2.3.2. For a general critique on the use of house size in archaeology see Wilk 1983; Blanton 1994; Wason 1994, 137-141, for a specific Bronze Age critique see Fokkens 1999, 33; 2003, 24.

the distribution pattern is the fact that at most settlement sites, the distribution of the outbuildings follows the long axis of the farmhouses. At Tiel, Dodewaard and Lienden two separate zones to the long sides of the houses may be envisaged, whereas at the other sites some outbuildings were found in between (*i.e.* near the short sides of the farmhouse). In the latter cases the general distribution is ovoid in shape. Often, the density near the short sides of the farmhouses are low to zero, which makes sense if one considers that most Middle Bronze Age(-B) farmhouses from the Dutch river area had entrances in the short sides (see section 5.2.3.3). Leaving this area clear would allow for more convenient livestock handling and manoeuvring with wagons.

Within the more general distribution of the outbuildings, areas of more frequent outbuilding placement are indicated as darker shaded areas (fig. 6.14). At De Bogen, De Horden, and Tiel these form elongated areas near the farmhouse long side walls. At Zijderveld, Eigenblok, Lienden en Dodewaard this pattern is less clear, and the densest clusters can with equal validity be described as being situated near the longhouse's corners. So, for all Middle Bronze Age-B settlement sites in the Dutch river area, the two preferred locations for outbuildings can be indicated as 'along the long side walls of the farmhouses' and/or 'near the corners of the farmhouse'.

Albeit similar, the distribution patterns for the different settlement sites are clearly not identical. Perhaps this is, not unlike the possibly deliberately different orientation of the farmhouses, an intentional – or at least meaningful – distinction. If the differences in distribution were to be stressed, the Zijderveld distribution is the best example of the placement of outbuildings 'at the farmhouse's corners', while that of Eigenblok may be best described as 'predominantly in the west part of the house-site', at that of Dodewaard (and Tiel?) as 'outbuildings to the south/west of the farmhouses'. The preferred location of outbuildings was therefore probably bound by rules or preferences at the settlement site level.

The (conceptual) interrelations of outbuildings and houses

Having indicated general and possible preferred locations for the outbuildings, it must be stressed that there are some additional arguments that convey the strong (conceptual) ties between farmhouses and outbuildings for the Middle Bronze Age(-B).

The first of these arguments focuses on orientation. At six of the settlement sites, a preferred correspondence in orientation (*i.e.* orientated parallel or perpendicular to) between the outbuildings and the nearby farmhouse could be argued for. However, it is clear that the differences in orientation between houses and outbuildings on a hypothetical house-site is often bigger than the difference in orientation between the houses of a given settlement site.[51] This may predominantly be a side-effect of the lack of chronological resolution (*i.e.* the palimpsest character of the data used). This is also suggested by the fact that at several house-sites, outbuildings with a deviant orientation were found to overlap with the house ground plan, arguing against contemporaneity.[52] Alternatively, the orientation may not have needed to be that precise. In any case, it was far from arbitrary. At the majority of sites, the direction of most outbuildings follows that of the houses or is (again, roughly) perpendicular to it. An additional salient property of the outbuilding's orientation is the fact that they – like the houses – predominantly avoid large parts of the SW-NE quadrants in the wind-rose diagrams (fig. 6.16).[53] As with the houses (fig. 6.15), specific (slightly different) orientations seem to have been predominantly avoided at the different sites.

The second argument in support of the conclusion that farmhouses and outbuildings were conceptually linked in Bronze Age perceptions, focuses on rebuilding. At De Bogen, Lienden and Tiel, locations could be indicated where outbuildings had been rebuilt repeatedly, yet they could often no longer be identified individually with sufficient certainty.[54] At Zijderveld and Dodewaard, the picture was much clearer. At least six granaries were rebuilt at Zijderveld and at least two at Dodewaard (fig. 6.17). This rebuilding is particularly significant as it shows

51 See the wind-rose diagrams fig. 6.39; 6.42; 6.45; 6.48; 6.50; 6.53 and 6.56.

52 *E.g.* Zijderveld house-site 1 (fig. 6.37, A), De Bogen house-sites 45AH and 30GH (fig. 6.43, E; K), see also Enspijk (Appendix II). At De Horden, outbuildings with a similar orientation could be reconstructed, but which have been tentatively interpreted as a preferred placement of granaries on former house locations (see sections 4.5.3; 6.3.9).

53 *Cf.* Therkorn (1986, esp. 33-35) and Kok (1998, 119) for avoidance in orientation as a significant property of (Roman) Iron Age period houses.

54 *E.g.* De Bogen house-site 28-1AH (fig. 6.43, A), Lienden house-site 14 (fig. 6.49, A) and at Tiel between house-sites 5 and 6 (fig. 6.55, F). See also Wijk bij Duurstede - De Geer house-site 2 (Appendix IV).

that is was important to maintain the same orientation as well as location when rebuilding. Both the orientation and location of outbuildings were presumably defined in relation to the nearby farmhouse.

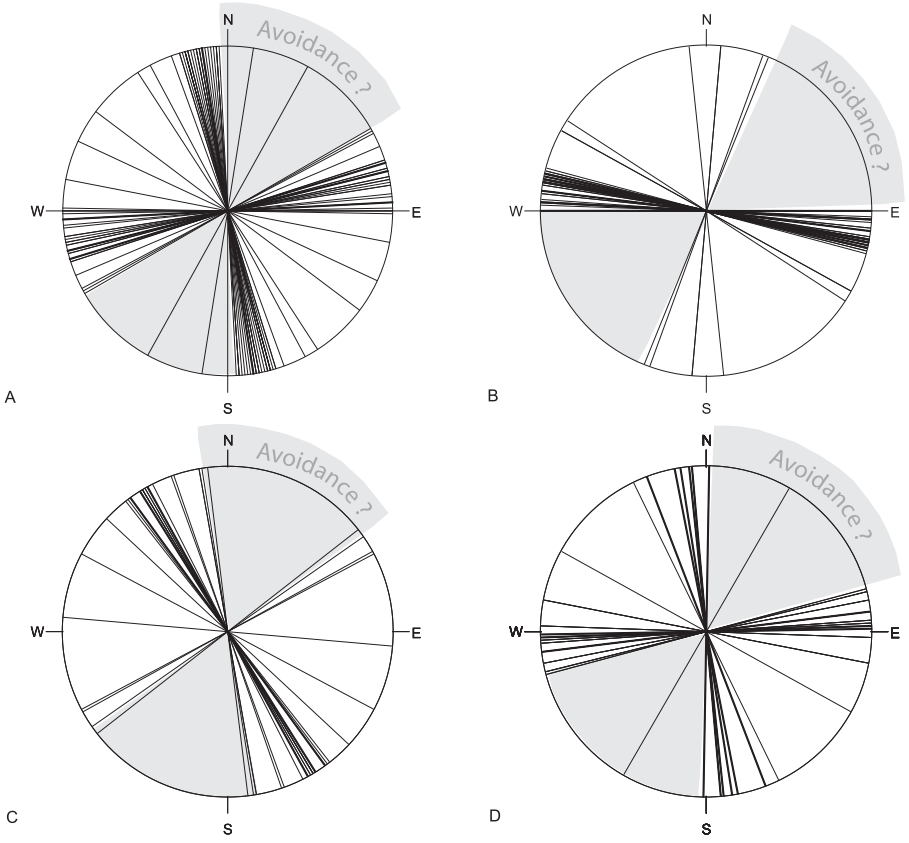


Fig. 6.16 Wind-rose diagrams for the outbuildings (thin black lines) and houses (thick black lines) at Zijderveld (A), Wijk bij Duurstede (B), Dodewaard (C) and Tiel (D). The predominantly avoided areas are indicated in light grey.

Third, two additional examples support the notion that houses and outbuildings were (conceptually) interrelated house-site elements. The first example concerns house-sites 2 and 3 from Tiel - Medel 8. As already discussed above (section 6.3.12), two nearly identical house-sites, but with a slightly different orientation were reconstructed (fig. 6.12, B-C). Both the lay-out (*i.e.* the distribution and orientation) and the content (*i.e.* the number and types of elements) appear to have been copied.[55] Such 'cloning' of house-sites may have been a more common phenomenon, but as the types of outbuildings involved are rather generic, it is hard to positively indicate other comparable 'cloned' house-sites with certainty. The differences in distribution patterns for the outbuildings between settlement sites may however be a weak proxy thereof.

The second example concerns a presumably Middle Bronze Age-B house-site from Wijk bij Duurstede - De Geer. The 'De Geer' excavations are situated *c.* 500 m north of Wijk bij Duurstede - De Horden and have unfortunately also not been published in full (see section 4.5 and Appendix IV). Despite moderate to poor feature preservation, two house-sites could be identified based on a distinct pattern of ditches (J. van Doesburg, pers. comm., Aug. 2006). At De Geer, these ditches were situated somewhat more distant from the house-walls. At house-site one, the ditch around the house had a small protrusion that seems to incorporate an area where several (if tentative) overlapping outbuildings can be reconstructed (fig. 6.18). Regardless of whether the extension of the ditch was purely functional

55 Note that the two 'extra' outbuildings near house 2 have a deviant orientation, possibly confirming the idea that they do not belonge to these house-sites (the site has also seen intensive Late Bronze Age occupation).

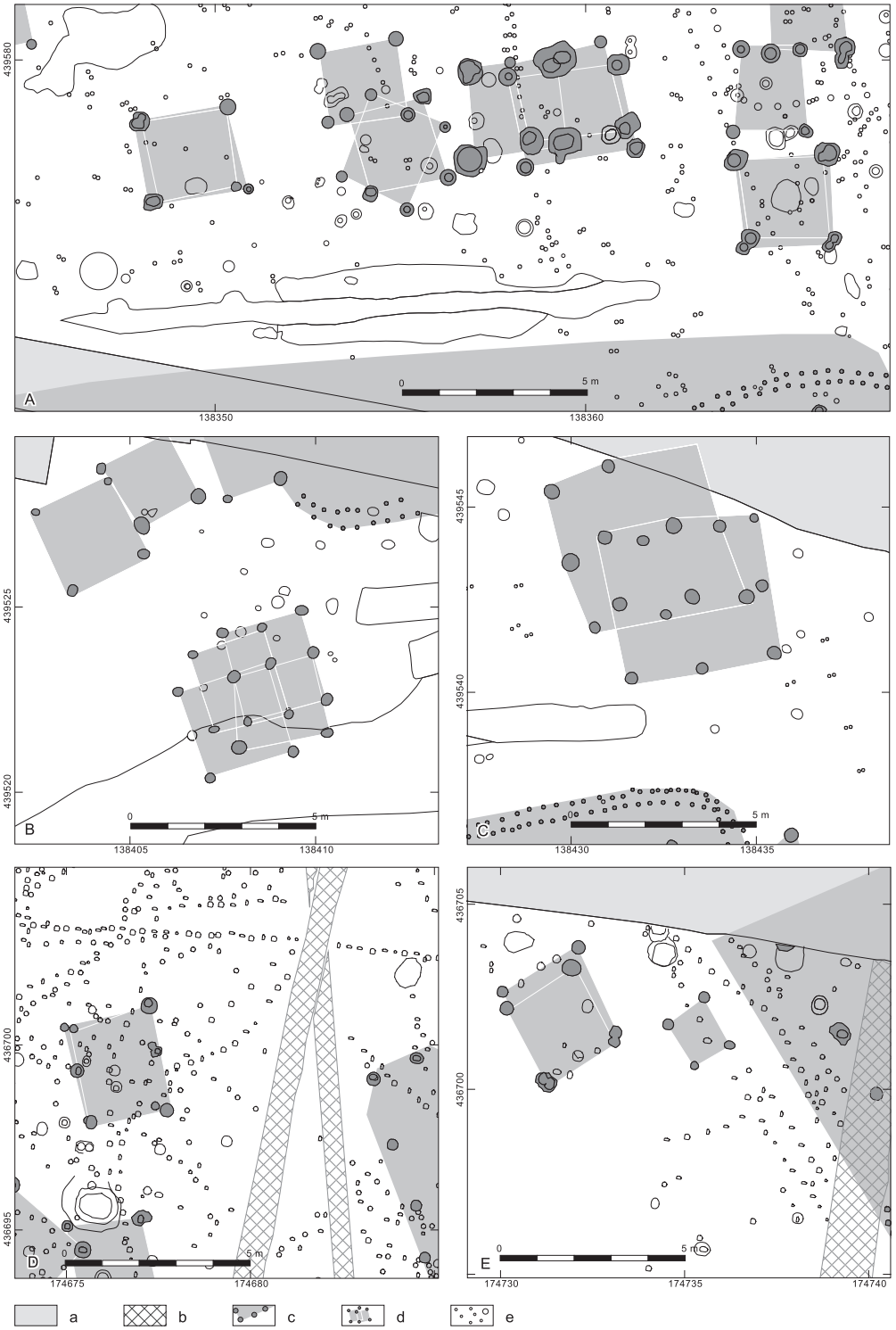


Fig. 6.17 Examples of granaries rebuilt on the same location with the same orientation at Zijderveld house-site 1 (A), house-site 3 (B, C), west of Dodewaard house-site 2 (D) and on Dodewaard house-site 1a/b (E); all to the same scale. For context see sections 4.2 and 4.7 and Appendices I and VI.

a: not excavated, b: recent disturbances, c: houses or barn-/shed-type outbuildings, d: rebuilt granaries, e: other features.

(*i.e.* a drainage function was needed) or whether (in addition) it was seen as conceptually connecting house and outbuildings, it remains the most tangible expression by Bronze Age farmers themselves that houses and outbuildings 'went together'.

Outbuildings and the size of the hypothetical house-site

The argumentation in this chapter is based on the spatial scale of the hypothetical house-site, which had been defined as a 50 by 50 m square. One may suspect, that the shape and size of the hypothetical house-site has influenced or even distorted the interpretation of the settlement site element distributions (fig. 6.19). For instance, the argument that outbuildings cluster near houses may be erroneous if the distribution of outbuildings is uniformly high for the entire settlement site, and the hypothetical house-site shows an unrepresentative selection thereof (*cf.* figs. 6.19; 6.21).

To asses this risk, a quantitative approach towards the suggested clustering of outbuildings is necessary. For this purpose, a nearest-neighbor analysis has been done for all outbuildings on a settlement site. For each outbuilding, the shortest distance between the outbuilding and the nearest house has been determined (as the crow flies, meter accuracy).[56] Thereafter, the distances measured have been classed at 5 m intervals and a histogram has been compiled (fig. 6.20, A-B). The top part of this figure shows the frequency (*i.e.* the numbers of outbuildings with a closest distance to a house) per 5 m class, up until 130 m (fig. 6.20, A).[57] Evidently, this is no random distribution.

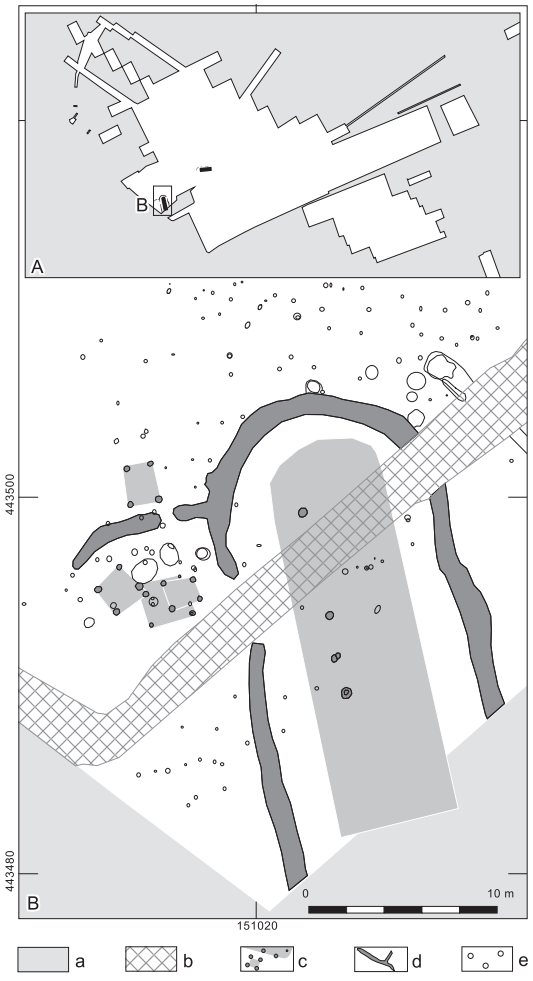


Fig. 6.18 Possible MBA-B house-site 1 at Wijk bij Duurstede - De Geer (B), for location see inset (A).

a: not excavated, b: recent disturbances, c: features of structures, d: ditch, e: other features.

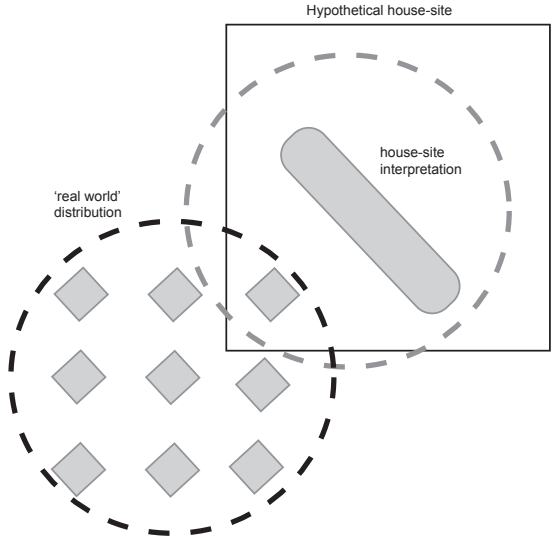


Fig. 6.19 Schematic diagram of how hypothetical house-site shape and size can affect interpretation.

56 The starting point was the centre of the posthole with the best location for the shortest distance, the end measurement was the nearest point of the reconstructed wall line. For houses where no wall lines had been preserved, a mean width of 6 m has been assumed (see fig. 5.26). Additionally, the distance to the second closest house has been measured. This may serve as a proxy for house density.

57 In reality, larger distances have been measured for two outbuildings, but these can no longer be meaningfully understood in relation to the houses and have been left out here. Generally, larger distances concern structures situated in small scale trenches or close to the excavation limits, which may explain why no houses have been recognized in the vicinity of these.

The lowermost graph (fig. 6.20, B) shows the individual class distributions for the different settlement sites. The comparable morphology of the graphs proves that the peak in the cumulative graph at the top is an accurate presentation of the distribution data. Undisputedly, outbuildings cluster near Middle Bronze Age(-B) farmhouses in the river area.

Based on the proposed dimension for hypothetical house-sites at 50 by 50 m, 71 % of all outbuildings are situated on a hypothetical house-site.[58] Furthermore, a steep drop is visible in the histogram-curves at 20-25 m, suggesting that this indeed is a distinct group.[59] The second, smaller peak between 55 and 85 m, may very well be composed of outbuildings that in reality belong to house-sites for which no house has been uncovered. As these are frequently located in small trenches or situated near the excavation limits (see the data in Chapter 4 and the Appendices), this is a plausible scenario. Consequently, the high number (71 %) of outbuildings on house-sites may suggest that the distance to the second peak is an indirect reflection of the distance between house-sites during the Middle Bronze Age(-B) in the Dutch river area (*cf.* section 6.5, table 6.3).[60]

Again, one may argue that the size of the excavated area in relation to the size of the house-site, leads to the erroneous conclusion that the second peak may be related to ill-mapped house-sites. In figure 6.21, a scenario is forwarded where a similar bi-modal distribution may be observed, while in reality the outbuildings were not part of additional house-sites.

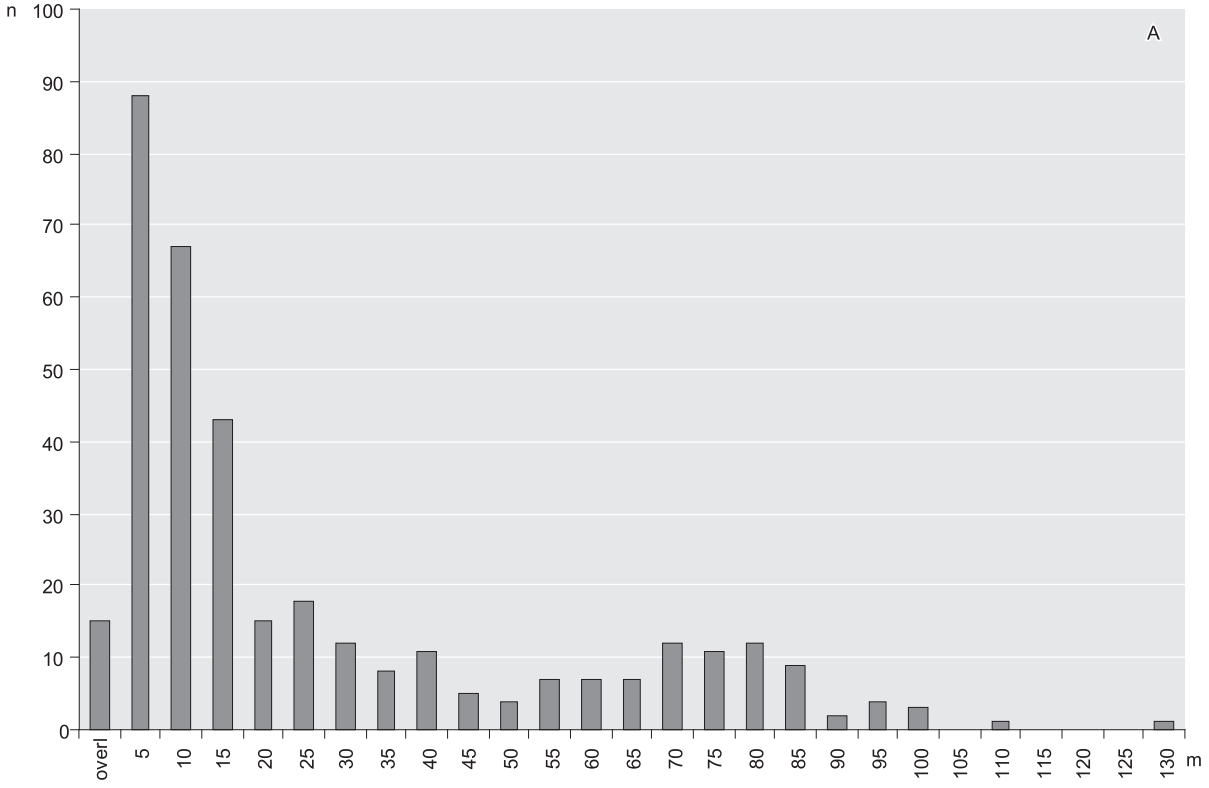


Fig. 6.20 Frequency of occurrence of outbuildings with a shortest distance to a house per 5 m class, shown for overlapping ('overl') outbuildings and those up to 130 m from houses. The second graph (overleaf) shows the individual histogram values for Wijk bij Duurstede - De Horden (WBD), Zijderveld (ZIJD), Dodewaard (DOD), Eigenblok (EBL), Lienden-Kesteren (KES) and Tiel - Medel 8 (TLM).

58 A total of 202 out of 283 outbuildings are situated with 25 m distance from a farmhouse.

59 If a moving average trend line is drawn for the data in graph 6.20, the steep drop may be argued to be situated at 35 to 45 m instead.

60 Again it should be stressed that with the palimpsest nature of both the sites in question, as well as that inherent in the VASO methodology (see section 6.2), these outbuildings may well date from other phases.

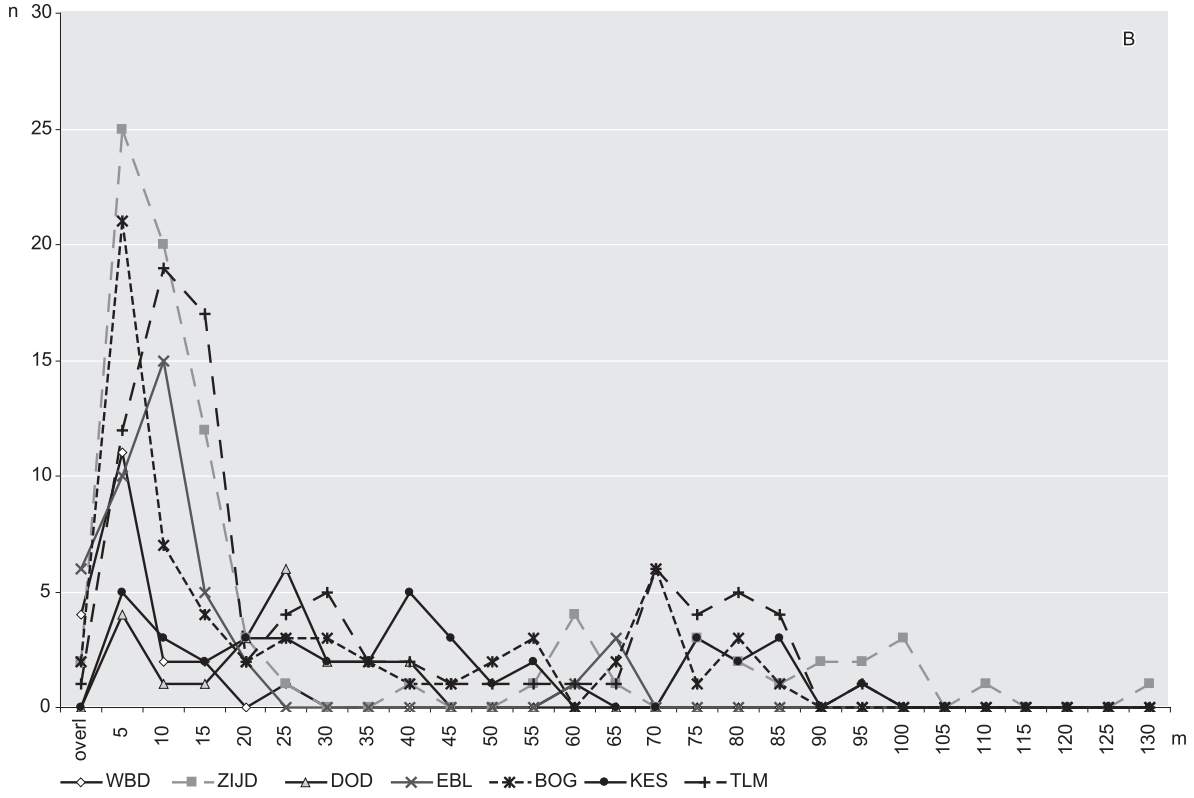


Fig. 6.20 (continued) Frequency of occurrence of outbuildings with a shortest distance to a house per 5 m class, shown for overlapping ('overl') outbuildings and those up to 130 m from houses. This graph shows the individual histogram values for Wijk bij Duurstede - De Horden (WBD), Zijderveld (ZIJD), Dodewaard (DOD), Eigenblok (EBL), Lienden-Kesteren (KES) and Tiel - Medel 8 (TLM).

To investigate whether alternative distributions, played out at larger spatial scales, may have affected the results of house-site analyses, another spatial research strategy was adopted. The interpreted excavation results (*i.e.* the base files compiled prior to VASO) were overlain with a 4 by 4 m grid.[61] As VASO has indicated that houses may very well have been spatially and conceptually central to prehistoric house-sites, the grid was rotated to align with the long sides of the farmhouse. The overall dimensions of this 4 by 4 m grid were 100 by 100 m, *i.e.* a factor four larger than the hypothetical house-site. The centre point of the grid was overlain with the centre-point of each Middle Bronze Age(-B) house.[62] Thereafter, for

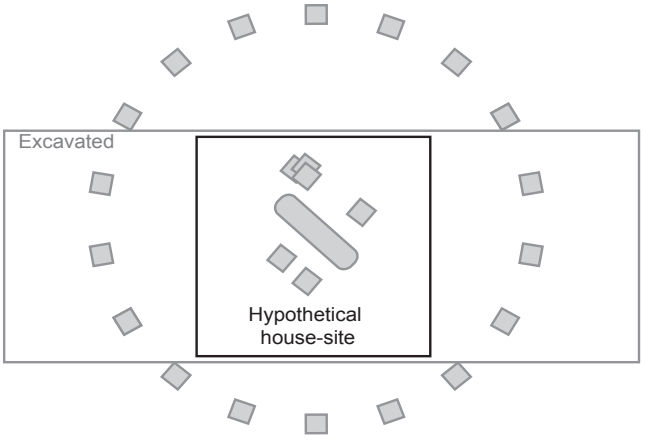


Fig. 6.21 Schematic diagram of how excavation and hypothetical house-site shape and size can affect interpretation, example of an alterative pattern resulting in a bi-modal distribution.

61 With a house width of 6 to 8 m and mean dimensions of 2 by 2 m for a four-post outbuilding, a 4 by 4 m grid starting from the centre of the house allows to accurately map whether outbuilding are situated just outside, or overlapping with the house walls. Larger grid cell size seems unwise, whereas more detailed analyses should be executed with the nearest-neighbor data instead of the raster data set.
62 The latter point being defined as the centre of gravity for the smallest inside shape which could be drawn when using all roof-bearing posts as nodes.

each grid-cell the numbers and types of outbuildings were documented.[63] This methodology allows an (somewhat crude) analysis of the distribution of house-site elements at a wider spatial scale (fig. 6.22).

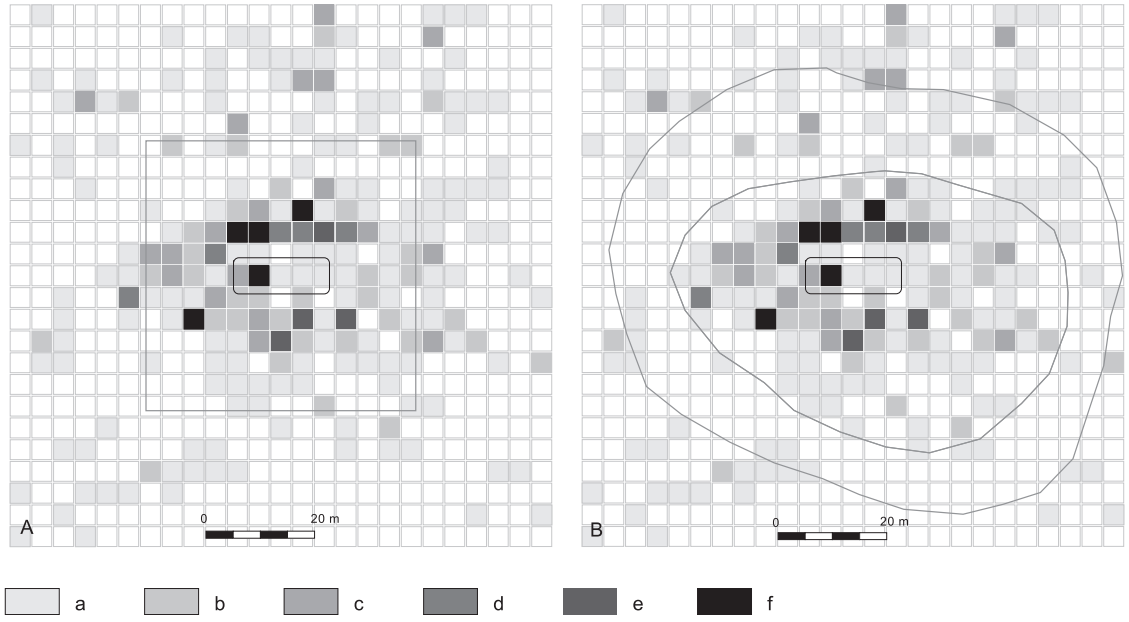
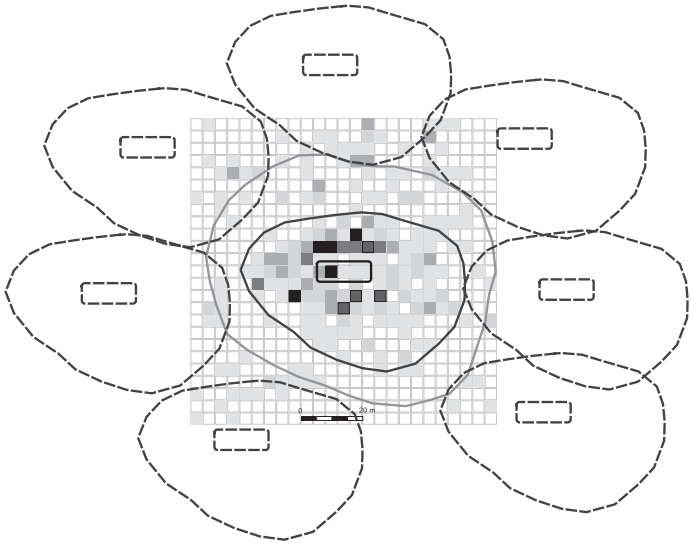


Fig. 6.22 Distribution of all outbuildings for all MBA(-B) house-sites discussed in this chapter. In (A) a hypothetical house and the dimensions of the hypothetical house-site are plotted, in (B) an interpretation of an 'empty' area around the main outbuildings cluster is offered.

a: one outbuilding, b: two outbuildings, c: three outbuildings, d: four outbuildings, e: five outbuildings, f: six to ten outbuildings.



It is clear that the main distribution of outbuildings is situated within the hypothetical house-site (*c.* 60 %),[64] although the distribution appears irregular to somewhat ovoid in morphology around the farmhouse (fig. 6.22, A).[65] The right hand side of figure 6.22 suggests an interpretation with a core area, an empty zone and a peripheral area. They comprise *c.* 66 %, 12 % and 21 % of the outbuildings respectively.[66] The outbuildings situated in the periphery also seem to cluster, and show again no random distribution.

Fig. 6.23 Schematic interpretation of the outbuilding distribution diagram (fig. 6.22).

63 The centre of gravity was determined as with the houses (*supra*) and determined to what grid cell a given outbuilding was assigned. As duplication is again a problem (see 6.3.4), these are not real numbers.
64 As duplication is again a problem (see 6.3.4), these are not real numbers. Comparison of these figures is however allowed. For 358 recorded outbuilding locations, 218 are within the hypothetical house-site.
65 The fact that the long axis of the ovoid distribution is in line with the longhouse axis may again be interpreted as a consequence of strong house-outbuilding interrelation.
66 In total 238, 44 and 76 recorded outbuildings respectively.

This is in support of the propositions made above that the distribution of the outbuildings is also related to the presence of farmhouses at higher spatial levels, and that the second peak may be related to incompletely excavated settlement sites (fig. 6.23).

Of course, it has to be checked whether individual sites do not severely distort the composite overlay for this distribution. As these distribution plots do not generally differ from the composite plot depicted in fig. 6.22, they have been omitted (but see fig. 6.35). Only the distribution plot for the Dodewaard outbuildings differs markedly, but this is explained by the narrow and long shape of the excavated area in combination with the proximity of several house-phases (fig. 6.35, F).

To conclude, a final problem must be addressed. Having argued above that houses and outbuildings were spatially and conceptually interrelated, does this imply that we have to interpret all outbuildings as relicts of (unrecognized or not fully uncovered) house-sites? This seems unwarranted. Their properties (rebuilding, orientation, integration by ditch systems) when placed next to farmhouses, do not exclude them from occurring elsewhere, with comparable or other properties, on settlement sites. To avoid the obvious objection that such outbuildings were part of undetected house-sites, these should preferably be located in isolation in extensively excavated areas that have yielded no house plans. The data set of outbuildings that conform to these criteria, is unfortunately slim. All too often settlement sites have been excavated in non-continuous and/or small trenches (see Chapter 4 and Appendices).

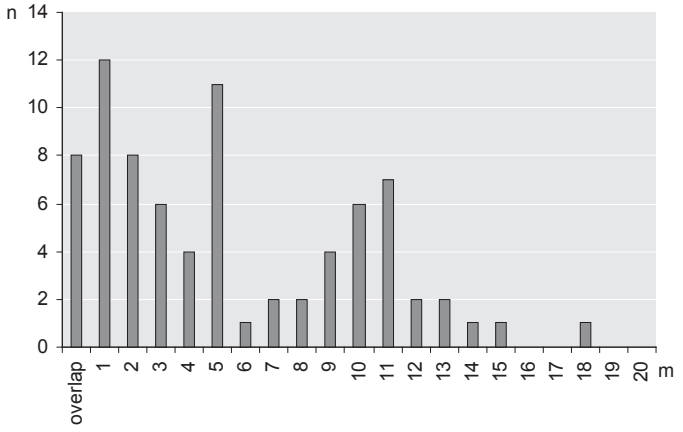


Fig. 6.24 Frequency histogram of shortest distance between outbuildings not part of MBA(-B) houses-sites and the excavation limit, overlapping (overlap) and classed per meter.

To quantify the severity of this problem, the shortest distance between an outbuilding (not part of a house-site) to the excavation limit has been recorded. For 78 'stray' or 'isolated' outbuildings, 8 overlapped with the excavation limits and the others are situated at 5.5 m mean distance from it (see fig. 6.24 for details).[67] Clearly, the small size of the various trenches complicates the interpretation of these outbuildings.

Nonetheless, some of these cases must be dealt with in more detail, as outbuildings do indeed in some cases occur in locations more spatially distant from houses. At Dodewaard, a cluster of stray outbuildings was situated *c.* 21 m east of house-phase 1a (fig. 6.1, A). Some of them are situated at *c.* 10 m from the excavation limits, but the orientation of several of them follow that of the Middle Bronze Age(-B) houses at this site. It is not unlikely that other house-phases are situated just to the east of the excavation limits. In the westernmost part of the Dodewaard excavation, again a cluster of outbuilding was recognized in relative isolation (fig. 6.25, A). Here, a large barn/shed type outbuilding was reconstructed with an orientation not unlike that of the Middle Bronze Age(-B) houses (see fig. 6.25, A, no 5). The span and spacing of this outbuilding is not unlike type-A2 houses elsewhere in the river area (notably Wijk bij Duurstede - De Horden; see section 4.5; Appendix IV). Possibly, this structure was another Middle Bronze Age house plan.[68] In this study, however, the interpretation as a barn/shed-type outbuilding as suggested by Theunissen & Hulst (1999a, 144-145) has been maintained, but the possibility remains that it was a house in reality. At Tiel - Medel 8, also some granary-type outbuildings were identified at a reasonable distance from the excavation limits (fig. 6.25, B). Whereas they may very well have been located in an 'isolated' position in prehistory,

67 Only one outbuilding has been left out. This concerns a barn/shed type outbuilding at Wijk bij Duurstede - De Horden house-site 9, which is situated 23 m from the house and 65 m from the excavation extents. This outbuilding was presumably also part of the house-site of house 9 (see Chapter 4; fig. 4.28).

68 It is however the only A2-type house among clear-cut A1 houses (see section 5.2.3.3). This, and the slightly deviant orientation could indicate that it belonged to a somewhat earlier or later occupation phase, but definitive evidence is absent.

two comments must be made. Firstly, a tentative Late Bronze Age house is situated close-by (fig. 6.25, B no 4) to which these outbuildings may have belonged.[69] Alternatively, a large barn/shed type outbuilding with an orientation identical to that of the Middle Bronze Age-B houses was also part of the cluster (fig. 6.25, B no 52). Possibly, this outbuilding represents a farmhouse of a yet unknown type. As no direct dates, comparable structures or associated artefacts are known for outbuilding 52, the interpretations of this cluster of outbuildings as being either situated in an isolated position and dating the Middle Bronze Age-B, or as part of the Late Bronze Age outbuildings around possible house 4, remain equally plausible.

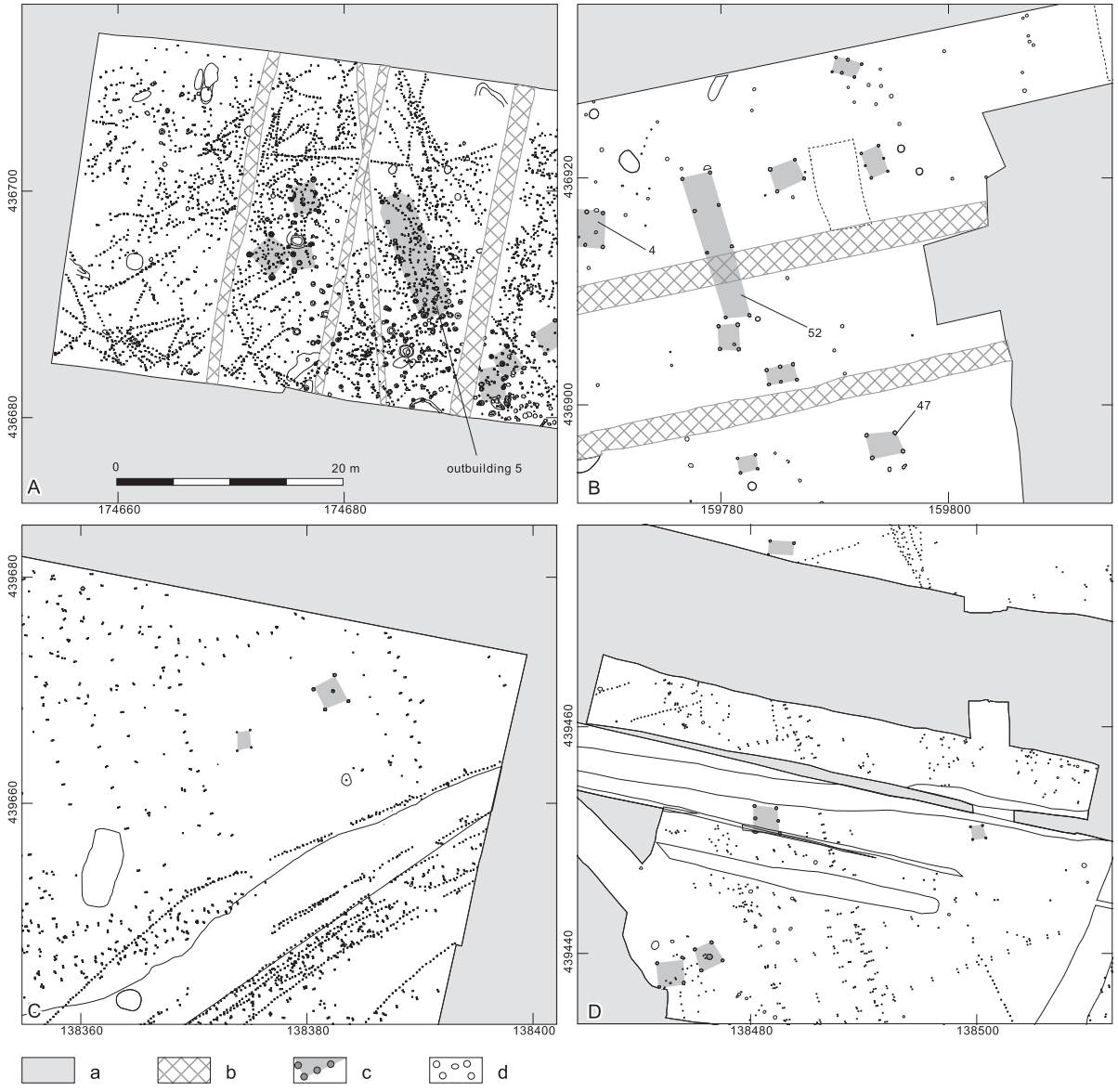


Fig. 6.25 Examples of granaries in relative isolation and distant position from the excavation limits at Dodewaard (A), Tiel - Medel 8 (B), Zijderveld; north of house-site 1 (C) and Zijderveld; southeast of house-site 3 (D), all to the same scale.

a: not excavated, b: recent disturbances, c: features associated with structures, d: other features.

69 From one of the postholes of outbuilding 47, two fragments (10 g) of possible Iron Age sherds were recovered (original documentation). As no pottery with distinct Early Iron Age characteristics have been uncovered (Arnoldussen 2007), a Late Bronze Age date for these fragments seems plausible.

At Zijderveld, there are two locations where granary-type outbuildings appear in relative isolation (fig. 6.25, C; D). It is unclear whether the outbuildings depicted in figure 6.25 (C) are Bronze Age or Iron Age in date, as in this part of the site Early Iron Age occupation also took place (Theunissen & Hulst 1999b, 160-164; Appendix I). Although the orientation of the largest five-post outbuilding is more in line with the nearby Early Iron Age house, it also still corresponds reasonably well (< 15 degrees deviation) to the type-2 fence-lines which are though to date to the Middle Bronze Age occupation phase. The granary-type outbuildings in the south-east part of the Zijderveld excavation, most likely date to the Middle Bronze Age-B (fig. 6.25, D). They are situated in an area where two vegetation horizons wedge-out (Arnoldussen 2003), indicating that a thin layer of clay sedimentation covered the Middle Bronze Age-B occupation traces.[70] The low feature density documented and the absence of Iron Age house plans, renders it plausible that this area was subjected to gradual drowning during the Middle Bronze Age-B (see Chapter 2) and that the Iron Age occupation was confined to the highest parts of the levee- (and covering) deposits in the northern parts of the Zijderveld excavations. It unfortunately cannot be excluded that these outbuildings date from the Iron Age, as two ditches yielding Iron Age ceramics were also uncovered in that area (Knippenberg & Jongste 2005; Appendix I). The ditches may alternatively be the only features dug down deep enough to have penetrated the Middle Bronze Age vegetation horizons.

In short, the evidence for granary-type outbuildings placed in isolation (*i.e.* at large (> 25 m) distance) from the houses is present, but weak. Their isolated position may be challenged if (less-typical) structures are re-interpreted as houses (*e.g.* Dodewaard, Tiel) or when longer-term occupation is considered (*e.g.* Tiel, Zijderveld). Nonetheless, it remains at least plausible that a number of smaller outbuildings were situated in areas considered by Bronze Age communities as 'placed beyond the house-site'. These outbuildings could (but need not) have served different functions compared to those placed more closely to the houses, which are generally interpreted as storage facilities (section 5.4). The more distant outbuildings may, in addition or alternatively, have contained fodder, or agricultural tools or objects that were preferably stored more closely to the areas where fields and pastures were situated. Both the exact function and the distribution of such outbuildings remains unfortunately rather unclear. It can only be stated that granary-type outbuildings by no means reflect an even distribution. At the more extensively excavated settlement sites (*e.g.* Zijderveld, De Bogen, De Horden), large areas (approximation the size of hypothetical house-sites) have been uncovered where no outbuildings were recognized, despite sufficient feature preservation.

6.4.3 Fences, fence-systems and their relations to house-sites

Fences are frequently interpreted as features that were part of, or even delimited, later prehistoric house-sites (table 3.2 and section 5.5).[71] The results from the nineteen-seventies excavations at Zijderveld are usually interpreted as the best example thereof (*e.g.* Fokkens 2005b, 425). The notion that fences may have delimited prehistoric house-sites was based on the observations by Theunissen (1999, 168-169) that type-1a fences seemed to cluster near house-sites, and that some fence-lines seemed to represent rounded 'corners' enclosing more or less rectangular areas around the houses (*cf.* figs. 4.1 and 5.45). Although it is very likely that – perhaps more by consequence than by intent – fence-lines may have bounded prehistoric house-sites, I will argue that this was by no means their only, or most typical, function. Rather, fences were used for landscape parcelling at spatial scales which surpass that of the house-site.

The best-case scenario? The Zijderveld fence systems

The rounded corners of stretches of fence at some Bronze Age house-sites (*e.g.* fig. 4.1; fig. 4.9, A) might suggest that these were intended to enclose a particular area. A fully enclosed area, has however seldom been found.[72] Instead, rounded corners in fence trajectories *suggest* rather than *confirm* that these were intended to enclose particular plots. Consequently, the 'rounded corners' of the Zijderveld fence-system(s) need to be seen in proper perspective.

70 Unfortunately, it is unclear from which vegetation horizons the postholes of the granaries became visible.

71 *E.g.* Roymans & Fokkens 1991, 10; Hessing 1991, 44; Fokkens 1991, 96; Schinkel 1994, 24; 1998, 26; 2005, 523; 524-535; Theunissen 1999, 112; 194; Woltering 2000, 263.

72 But see Theunissen and Hulst (1999b, 164 fig. 4.36 no 1) for a *c.* 7 by 12 m rectangular fenced of area. Within this area, a post-configuration (tentatively interpreted as a round structure) with a post dated to Middle Bronze Age-A (GrN-5376: 3370 ± 80 BP; *op. cit.*, 165) was recognized. See also Knippenberg & Jongste (2005, 72-75) for a possible oval *c.* 7 by 10 m ditch that may have contained an area enclosed by fences on its inside.

Fig. 6.26 Location and type-composition of fence 'bundles' at Zijderveld.

a: not excavated, b: reconstructed trajectory of the residual gully of the Zijderveld fluvial system, c: structures, d: type-1a(b) fences, e: type-2 fences.

Curvilinear fence-lines (*i.e.* all but the moderately straight lines) form only a minority (*c.* 30 %) of the total fence-lines reconstructable. Put otherwise: nearly 70 % of the Zijderveld fence-lines are relatively straight (*cf.* fig. 5.45).

Second, curved fences cluster near the higher parts of the landscape, where also most Iron Age features and structures were recognized. This implies that the risk of misdating these fence-lines to the Middle Bronze Age may be slightly higher, but this will play no major part in the discussions below. It is more important to stress that in the direct vicinity of houses 3 and 4 – and to a lesser extent, house 2 – curved fence-lines are almost absent. As other

types of fences *are* present, the absence of curved fence trajectories is not a problem of feature preservation, but indicates that stretches of fence with rounded corners (hinting at enclosed areas) were by no means a *condicio sine qua non* for Middle Bronze Age house-sites.

Third, the location of the curved type-1a fences around Zijderveld house 1 may suggest some problems of contemporaneity. If the distribution of granary-type outbuildings correlates to the extent of Middle Bronze Age houses-sites (as is indeed suggested by the data from Zijderveld as well as other Middle Bronze Age settlement sites from the river area; *supra*) the NNW-SSE fences connected to the rounded corners seem to cross-cut the outbuilding distribution around the houses. Moreover, some of these fences cross-cut the house ground plan proper, or – if the alternative reconstruction for the house suggested in this study is used (*cf.* Appendix I, figs. I.9; I.10) – are situated between 1.5 and 3 m from the eastern short side entrance. This area next to the entrance is generally left clear for practical reasons, and such close proximity of house and fence-lines may argue against contemporaneity.

Lastly, the claimed unbalanced distribution of fence types (type-1a near houses and type-2 in more distant areas (Theunissen 1999, 168-169; Knippenberg & Jongste 2005, 58) can be challenged. Both close to the houses, and in more distant locations, groups of parallel orientated fences (here labeled 'bundles') comprising different types of fences can be identified. Furthermore, several type-1a bundles can be identified at significant distances from the farmhouses (fig. 6.26, *cf.* fig. 5.45). The mixed-type nature of the fence 'bundles' suggests that fences of different types may have had similar functions, or at least that the fence-type was open to choice. The opposite interpretation however, need not be dismissed completely. It may have been the case that – if specific types of fences were used to set apart pieces of land with different (intended future) uses – that the mixed-types bundles indicate a continuity of plot sizes and dimensions, whilst the plot function changed. This may suggest that it was considered important not to disrupt preexistent (systems of orientation reflected in) landscape structuring, as has also been argued for the houses (see section 6.4.1).

Having questioned previous interpretations of the Zijderveld fence-systems, an alternative interpretation should be considered. It is proposed here that the Zijderveld fence-systems are best described as reflecting at least two phases of landscape structuring (or if one prefers; parcelling) with slightly different orientations. The two main (Bronze Age) phases both consist of a bi-axial perpendicular system of fence-lines with NNW-SSE and WSW-ENE as their dominant axes. Across most of the site, the high feature density – or alternatively the small excavation extents – does not allow to disentangle the two phases. Only in the extreme north and southeast of the excavations can two different systems of orientation be identified with any certainty (fig. 6.27). The curvilinear stretches of fence discussed earlier, as well as the houses and outbuildings, cannot be assigned to a particular phase on acceptable grounds. For the moment, it must remain open that one or both phases belonged to the Middle Bronze Age-B occupation phase at Zijderveld. In both phases, the fence-systems comprise predominantly moderately straight fence-lines, of which continuous lengths up to 50 m could be documented.[73] As these fences are generally confined by the excavation extents, it may be assumed that several of them were much longer.[74] Both axes seem to be equally well represented, indicating that 'perpendicularity' was a significant property of such fence systems (as, again, was argued for the houses). Few fence-lines, and almost none of the bundles, cross-cut Middle Bronze Age-B house plans (but see the discussion for house-site 1 above). This pleads in favor of contemporaneity, and suggests that while fence(-system)s did not *define* Middle Bronze Age house-sites at Zijderveld, at the very least they *respected* them. The clustering of bundles comprising the highest numbers of (predominantly type-1a) fence-lines near the Middle Bronze Age-B houses, cannot be ignored. Most likely, these represent subdivisions of, and additions to, the wider bi-axial fence systems. Here, proximity to the farmhouse presumably caused a more articulated functional differentiation of space (*e.g.* milking areas, livestock pens, dung- or refuse heaps) within, respecting, and as an integral part of the larger fence systems (*cf.* fig. 5.53, A). The larger numbers of fences in the bundles indicate that for some reason, it was important to replace these fences more often, in addition to stressing the importance of their continuity in placement. In these two properties, the continuity in place and frequent rebuilding, the Zijderveld fences are comparable to the outbuildings, in which similar patterns of rebuilding are reflected (see section 6.3.6, *cf.* fig. 6.17, A-C).

73 Knippenberg and Jongste (2005, 58) suggest that some type-2 fences may be reconstructed with lengths of 240 m. This is based on connecting fences from the trenches to the southwest of the A2 motorway to fences in the trenches to the northeast.
74 *Cf.* fig. 4.19, c-g; fig. 5.54, d; sections 6.3.8 and 6.3.12.

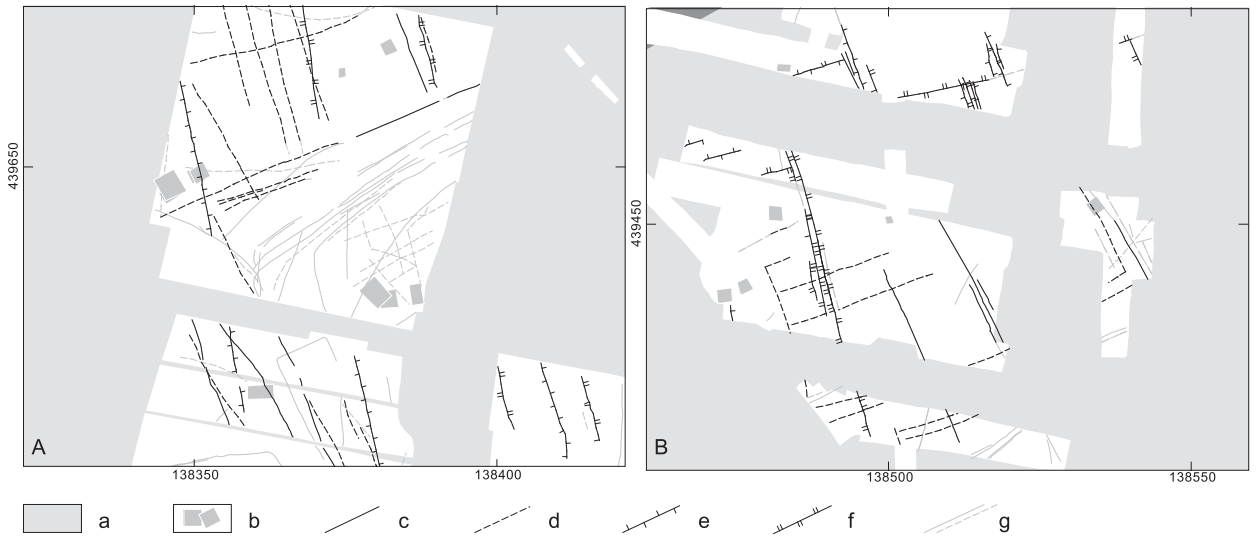


Fig. 6.27 Two orientation systems reconstructable for the Zijderveld fences in the north (A) and southeast (B) of the Zijderveld excavations.

a: not excavated, b: structures, c: system 1, type 1a(b) fences, d: system 1, type 2 fences, e: system 2, type 1a fences, f: system 2, type 2 fences, g: unassigned fences.

To conclude, the Zijderveld fence systems share several properties with the houses and outbuildings at Zijderveld. They conform to (two?) nearly identical systems of orientation, are bi-axial in nature, and both fences and granary-type outbuildings in close proximity to houses are frequently rebuilt. Furthermore, the fence systems seem to predominantly spatially respect or even emphasize the house-sites. These properties all hint at a meaningful interrelation between the two. Delimiting house-sites does however *not* seem to be the primary function of the fence systems at Zijderveld. Rather, the fence-systems parceled the landscape in an extensive bi-axial system, within which house-sites were situated and articulated.

Fences and fence systems at the other Middle Bronze Age settlement sites

At Eigenblok, fence systems of a spatial scale beyond that of the house-site are hard to reconstruct. This is in the first place a problem of scale, as the excavation limits can be found within 10 m for all of the Middle Bronze Age houses. However, there are faint indications that fences were perhaps more related to house-sites. Firstly, the house of house-site 1 had a somewhat deviant orientation compared to the other houses (*cf.* fig. 5.37, B) and some of the fence-lines around this house conform to the house in orientation, suggesting that these were possibly contemporaneous and (conceptually) interrelated. Secondly, different types of fences are rarely found together at the Eigenblok house-sites. At house-sites 1, 2 and 4, only type-1a fences are encountered, whereas at house-site 5 only type-2 and other types of fences occur. Only at house-site(s) six are both type-1a and type-2 fences found. Yet, despite these indications, only for house-site 1 can it be argued with any certainty that fences may have delimited the house-site. In this study, the type-2 fences at house-site 5 are interpreted as extending beyond, rather than as defining the house-site (*contra* Hielkema, Prangsma & Jongste 2002, 142). The 'corners' suggested by the excavators are all situated very near to the excavation limits and most likely represent intersections of fence-lines that extend beyond the excavation extents. At house-sites 2 and 4, fences cannot evidently be interpreted as house-site defining features, or as elements of a more large-scale fence system. Nonetheless, the fence-lines at house-site two can be followed for over 35 m in length and clearly extend beyond the house rather than surround it. The stretches of fence to the southeast of the short side of houses 2a/b have been interpreted as cattle droves, facilitating the movement of cattle into the farmhouse (Hielkema, Prangsma & Jongste 2002, 105).

In short, the Eigenblok excavations display a varied use of fences in relation to house(-site)s. In the shape of the fences at house-site 1 and the types of fences used at all house-sites, some individual (household?) choices may

be reflected. From the difference in orientation of the fences between house-site 1 and the other house-sites, it may be concluded that at this site, the orientation of the houses 'overruled' any – if ever present – system of fence orientation played out at larger spatial scales.

At the De Bogen excavations, a use of fences not unlike that at Zijderveld (*i.e.* bi-axial fence-systems extending beyond, but incorporating the house-sites) can be reconstructed. None of the fence-lines reconstructed at the various De Bogen sites could be interpreted as a house-site boundary. Rather, the fence-lines have been interpreted as belonging to (at least) two larger fence systems. The fence systems differed in orientation and in the types of fence constructions used (see section 6.3.7). Whereas fences of both type-1a and type-2 could regularly be followed for over 40 m, some stretches of type-2 fences may have exceeded hundred meters in length. Besides the long dimensions and straight trajectory, the fact that they rarely conform in orientation to the Middle Bronze Age farmhouses is also typical of the De Bogen fence-lines. Only at site 45, are fence-lines orientated more or less perpendicular to the Middle Bronze Age houses, but the intentionality thereof is questionable (fig. 6.28, B). At site 30, roughly parallel fences of different types are found close to each other, suggesting that boundaries could be (re)created by fences of different types. In addition, the many fence-lines at the latter site are all predominantly at 'non-corresponding' angles to the three Middle Bronze Age farmhouses and surround none of them (fig. 6.28, A). These observations explain why the VASO plot for the fences at the De Bogen excavations provides such an incoherent distribution (figs. 6.43, N and 6.28). Therefore, fences are presumably not primarily related to house-sites at De Bogen.

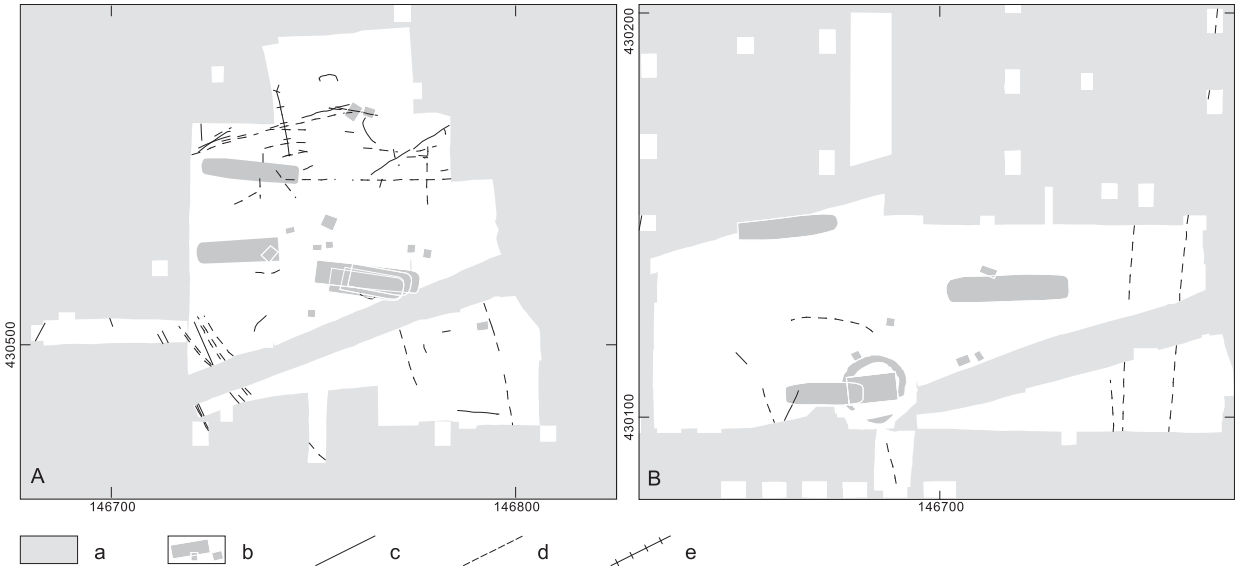


Fig. 6.28 Fence-lines and structures at De Bogen sites 30 (A) and 45 (B).
a: not excavated, b: structures, c: type-1a fences, d: type-2 fences, e: palisade.

As the excavations at Wijk bij Duurstede and Lienden have yielded no fences, the data on fence systems from one additional Middle Bronze Age settlement site in the river area, called Enspijk - A2 (section 4.3.3 and Appendix II) will be discussed in brief instead. There, similar properties could be documented for the fences as at the settlement sites discussed above. At Enspijk, despite adequate feature preservation, no fences could be identified that seemed to unambiguously surround house(site)s. This may partially be a consequence of the small width of the excavation, but most likely reflects the real distribution of fences in prehistory (fig. 6.29, A). To the northwest of the houses, several more or less parallel type-2 fence-lines were documented, whereas in the southeast predominantly type-1a fences were recognized (fig. 6.29, B and C respectively). Most of the fences have a SW-NE or NW-SE orientation, but this is not all too rigidly adhered to. In addition, a type-2 fence in the centre of the excavation has a distinct WSW-ENE orientation that is shared by a four-post outbuilding whose ground plan the fence overlaps. Presumably, there were

several (Bronze Age?) phases of use of this area. For the individual fences it remains unclear to which house- or occupation-phase they belonged. In any case, the bundles of fences in the north and south do indicate that some land-divisions had to be redefined over and over, without making radical changes in the location, orientation and types of the plot-boundaries used previously.

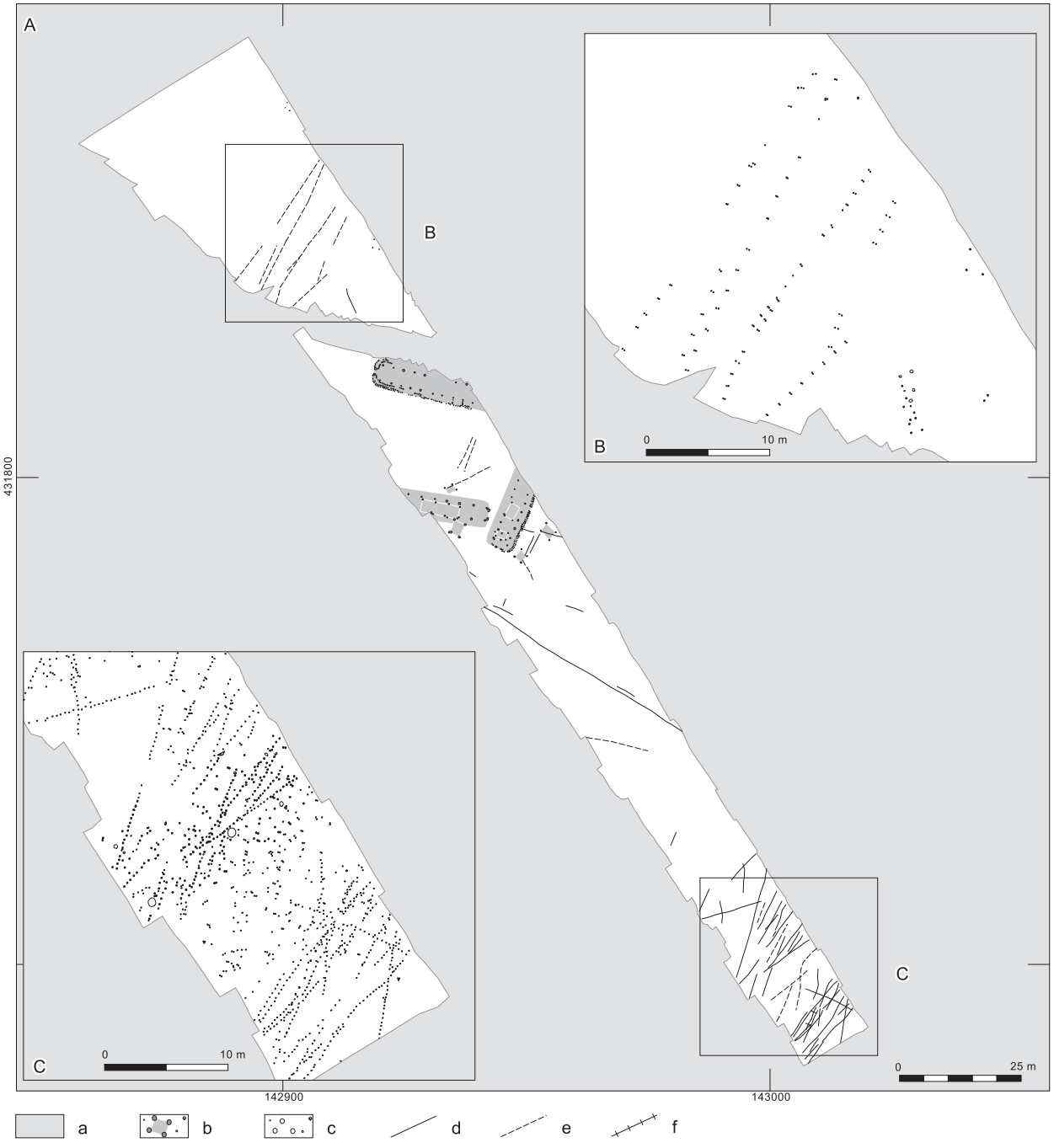


Fig. 6.29 Structures and fence-lines at the excavation Enspijk – A2 (after Ter Wal 2005b).
a: not excavated, b: features belonging to structures, c: other features, d: type-1a fences, e: type-2 fences, f: other fence types.

The differential distribution of the fences may have been related to the height (and/or lithology) of the micro-topographic landscape, with type-2 fences at the higher more sandy parts and type-1a fences in the more lower-lying clayey areas (Ter Wal 2005b, 25).[75] Interestingly, this interpretation may also hold true for the Eigenblok fences. At Eigenblok sites five and six, type-2 fences are most frequently found. These two sites are situated on top of the highest parts of the former Eigenblok fluvial system's levee deposits. The other Eigenblok sites, where type-1a fences dominate, are situated on top of somewhat lower-lying crevasse-splay deposits.[76] At Zijderveld, the excavated area is nearly entirely situated on top of the eponymous fluvial system's levee deposits.[77] Possibly, this may explain the occurrence of type-2 fences in all parts of the Zijderveld excavations. At the De Bogen excavations, which are all situated on (stacked) crevasse splay deposits, both type-1a and type-2 fences have been recognized in different parts (*i.e.* heights) of the micro-topographic landscape (section 4.4.3; Appendix III; Meijlink & Kranendonk 2002). This indicates that the occurrence of type-2 fences is by no means exclusively tied to locations with levee-deposits in the subsoil. A relation between type-2 fences and relative height or lithology (as reflected by vegetation, land-use, or land-use potential), may nonetheless still be valid. Type-1a fences appear to be situated in both higher (more sandy) and lower-lying (more clayey) areas. The latter appear to be sometimes more frequently rebuilt when situated in areas bordering lower-lying zones of the micro-topographic landscape.[78]

Middle Bronze Age fence-systems: bi-axial landscape structuration

I have concluded that a (bi-axial) system of orientation may have steered the orientation of houses, outbuildings and fences alike upon construction. With respect to the orientation of the houses, I have shown that settlements as close-by as within 5 km from each other may display different systems of orientation. To explain such differences, two scenarios may be considered.

The joint orientation of houses, outbuildings and fences represented and communicated the dominant axes of an individual settlement site. These built-up constituents can be classified as being part of the man-made parts of the cultural landscape. It is possible that the orientation of the (built-up part of) the cultural landscape was of a confined spatial extent. Based on the observations in Chapter 4 and on the analyses of the fences above, it is clear that such systems could in some cases be larger than several hundreds of meters. Possibly, there were areas between settlement sites which were not as intensively built-up, compared to those closer to the settlement site, or where the orientation of settlement site elements was not of equal importance. If this was the case, it is understandable that at *c.* 5 km distance, the exact orientation of the built-up landscape was diluted (fig. 6.30, A). However, it remains hard to accept that for communities for whom (farmhouse) orientation was evidently of importance – and who would certainly have had knowledge of the nature of the built-up landscape at walking distance from their

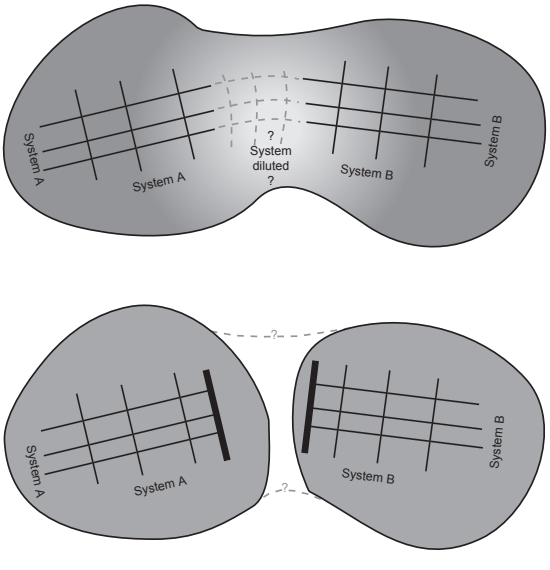


Fig. 6.30 Two scenarios for linkage between different orientation of (parts of) the cultural landscape; A: diluting of (adherence to) a system of orientation, no conceptual conflicts, B: deliberately expressed and possibly emphasised differences in orientation; conceptually contrasted.

75 The type-1a fences in the southeast may have delimited or concentrated near the Enspijk residual gully that was situated at that point (Feiken 2005, esp. 15 fig. 6).

76 See section 4.3.4; Appendix II; Jongste & Van Wijngaarden 2002.

77 See section 4.2.3; Appendix I; Knippenberg & Jongste 2005.

78 *E.g.* bordering the Enspijk residual gully (fig. 6.28, C; Feiken 2005), bordering an elongated depression (crevasse gully?) in the northwest part of the Zijderveld excavations (possibly a cattle drove; Theunissen & Hulst 1999b, 169-170).

own settlement site – exact replication of a system of orientation was, whilst strived for, not achieved. Therefore, an alternative interpretation must be considered.

In this second scenario, it is argued that the difference in orientation reflects deliberate conscious choices by the inhabitants of Bronze Age settlement sites. It may have been important for local communities to visually express a degree of separateness through opting for a different orientation of their built-up parts of the cultural landscape (fig. 6.30, B). At the boundaries in particular, such differences needed to be emphasized (*cf.* Cohen 1985, 12). Reflecting group identity was possibly an (additional) property of the extensive fence systems such as that to the south of the houses at Tiel (Van Hoof & Meurkens 2007), the type-2 fence-lines and some of the palisades at the east part of De Bogen (section 4.4.3, Appendix III) or the fences to the (north and) south of the Enspijk houses (section 4.3.3; Appendix II).

Fences and farmsteads: a conclusion

It is evident that fences can rarely be interpreted as having been erected principally to surround individual Middle Bronze Age(-B) house-sites. Only in two cases, is there sufficient evidence to assume that fence-lines may once have bounded individual house-sites. These two examples are Eigenblok house-site 1 (fig. 6.7, A), and – albeit less convincing – Zijderveld house-site 1 (fig. 6.6, A). This scarcity of clear fenced-off house-sites does not mean that Middle Bronze Age houses were never surrounded by fences. On the contrary, fences are frequently found on house-sites and often show clear spatial relations (*i.e.* avoidance or correspondence in orientation) to nearby houses. Accordingly, some of them may well *de facto* have bound-up Bronze Age house-sites, but they need not have been initially erected for this purpose. The crucial distinction is that the presence of fences that were principally constructed to surround house-sites, cannot be argued for. The fact such 'house-site girding' fences have not been uncovered at settlement sites where feature-preservation and excavation extents were adequate, is in support of this proposition.

The examples from Zijderveld and De Bogen in particular, demonstrated that the spatial interrelations between fences and houses are played out (and should be studied at) a spatial scale larger than that of the hypothetical house-site. In the areas between and around individual house-sites, systems of linear and curvilinear fences may be the dominant type of feature recovered. Fence-lines frequently can be followed in moderately straight trajectories of 40 to over 100 m. The excavation plan of Zijderveld in particular, illustrates the density and extent (presumably over several hundreds of meters, possibly continuous) to which the accessible parts of the micro-topographic landscape around house-sites were parcelled.

This parcelling with fence systems is frequently biaxial and generally more or less perpendicular.[79] Possibly, the fence systems represent the largest spatial scale on which information on the 'proper' orientation of settlement site elements was reflected or even transferred. The interplay of house-, outbuilding- and fence orientation is (in absence of more and better dates) prone to become a chicken-and-egg conundrum. Initial bi-axial fence systems may have steered house-orientation just as well as *vice versa*, and much more diverse scenarios were presumably in effect. These could comprise the gradual in-filling (compartmentalization) of initially laid-out systems, revisions, extensions and the like (*cf.* section 8.2.1; Johnston 2005). Only seldom do feature preservation and feature density allow reconstruction of major changes in the orientation or placement of fence systems. At De Bogen and Zijderveld, and possibly also Dodewaard, the orientation of stretches of fence hint at (at least) two different phases of land parcelling, whose exact dating and sequencing unfortunately escape us.

Fences were frequently rebuilt. The fact that fences of different types (especially type-1a and type-2) occur in close proximity and with a similar orientation, suggests that either the fences could be replaced with another type (yet retaining their function) or that – if fence type was coupled to plot function – the location of plot boundaries did not drastically alter upon a functional change of the plot. A few cases of rather discrete distributions of fence-types have been brought to the fore (*e.g.* Eigenblok, Enspijk), but the proposition that type-2 fences occur more frequent at greater distance from house-sites (Theunissen & Hulst 1999b, 168) remains as yet unsubstantiated. Nonetheless, the type-2 fences may have had a more limited distribution than the type-1a fences. At some Middle Bronze Age(-B) settlement sites (*e.g.* Enspijk, Eigenblok), the type-2 fences were documented on the highest parts (sandy) of the

79 As was also the case with the houses and to a lesser extent with house-outbuilding combinations (*supra*).

micro-topographical landscape, whereas the type-1a fences occurred both in higher and lower parts. As the height and lithology of the micro-topographical landscape (as a proxy for ground- and floodbasin-water levels) are related to agricultural usability, a different function for the (parcels bound by the?) different fence types may still be reflected. To put it more succinctly; a direct correlation between houses and the fences in their direct vicinity frequently cannot be established, indicating that it is generally unclear whether these fences surrounded a house-site. Moreover, stretches of fence extend far beyond the direct vicinity of the houses, suggesting that their primary function was to parcel the wider landscape. This system of landscape parcelling commonly shares its orientation with the houses. Additionally, this system of landscape parcelling seems to acknowledge landscape features (*e.g.* such as residual gullies) and seem to meaningfully integrate other (and/or older) built-up structures such as houses in a single cultural landscape.

6.4.4 The distribution and contents of pits on Middle Bronze Age house-sites

Pits are frequently, yet not invariably, discovered on Bronze Age settlement sites. Usually, their spatial relation to houses is unclear, but nonetheless it is generally assumed that pits may very well have been part of Middle Bronze Age(-B) house-sites.[80] Generally, their distribution is not determined by close-proximity to Middle Bronze Age(-B) farmhouses, but extends significantly beyond the houses (*e.g.* Fokkens 1991, 96; *infra*). In order to investigate the spatial interrelations of house(-site)s and pits, the latter have been incorporated in the VASO plots for the different Middle Bronze Age settlement sites.[81] As has already been argued above (section 5.7), the function of most pits remains unknown, so that only pits, possible refuse pit (*i.e.* over 500 g of artefacts) [82] and possible wells will be discussed at this point.

At Zijderveld, several pits were identified on the four house-sites, but these generally contained no or few finds (< 200 g; Hulst 1967a, 3; Theunissen & Hulst 1999b, 169). These pits are found close to (or even underlying the) house walls as well as in more distant locations. Only a single larger pit to the north of house 4 (fig. 6.37, D) and the drinking pools at house-site 3 contained a sufficient amount of artefacts to postulate a secondary function as refuse dumps (Knippenberg & Jongste 2005, 63-69). The low numbers of pits in general on these house-sites with good feature preservation indicates that pits did not occur in large numbers on Middle Bronze Age house-sites here.[83] Rather, pits seem to be part of a more general distribution of pits, which may show somewhat higher numbers of pits in the northern (*i.e.* higher) parts of the settlement site (fig. 6.31). Only for the drinking pool that may have been fed by the house 3 roof's watershed (see section 3.4.2; Appendix I) can a clear-cut relation between houses and pits be established. For all others, the interpretation of their interrelations must remain ambiguous. At Eigenblok, the pits frequently overlap with the house ground plans, but have yielded no indications that they were contemporaneous to them. The original function of most of the pits was hard to establish. Only two of the over hundred pits deeper than 10 cm contained more than 500 g of artefacts and may have been used (secondarily) as refuse dumps.[84]

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80 *E.g.* Van Regteren Altena, Buurman & IJzereef 1982, 25; Roymans & Fokkens 1991, 10; Hessing 1991, 44; Schinkel 1994, 27; Theunissen 1999, 194; Hermsen 2003, 66; Meijlink 2002b; 762; Berkvens, Brandenburgh & Koot 2004, 68; 76.

81 The selection of features as 'pits' per site was different. For Dodewaard and the pre-2003 excavations at Zijderveld, no feature-types distribution was known. Surface area in the excavation plans had to be used as a proxy, and interpretations rely heavily on Theunissen & Hulst 1999a-b. For the parts of Zijderveld excavated in 2003 and 2005, Tiel - Medel, Eigenblok and De Bogen, pits could be identified by their feature-type as recorded in the (digital) excavation data-sheets. For clarity (*i.e.* to exclude natural features and enhance visual pattern recognition with large data sets) only pits deeper than 10 cm have been incorporated for these sites. For Wijk bij Duurstede - De Horden no full excavation report or digital data were readily available (see Appendix IV), which means that only pits in the immediate (*i.e.* < 20 m) vicinity of the houses have been included in the VASO plot.

82 The 500 g of finds used here as a threshold value for possible refuse pits is arbitrary, but not insignificant. The content of pits at Bronze Age settlement sites in the river area is generally less than 500 g, but often complemented by a small group of features with weight contents of over 500 g to 1 kg. The latter may have been used (secondarily) for the disposal of settlement site debris. For example, of the 20 pits uncovered in the Zijderveld 2005 excavations, only four contained more than 200 g (of which three more than 1.8 kg; original fieldwork documentation). See also the unequal distribution of pit contents at Eigenblok (*infra*).

83 For the 2003-2005 excavations, only 7 of the total 30 pits (excluding wells and drinking pools) are situated close (< 20 m) from the houses. In other words; the majority of pits (*c.* 77 %) is situated beyond 20 m of the houses.

84 One pit at site 4 (4KL14; s226.180) contained 368 g burned clay and a stone (129 g; Hielkema, Prangsma & Jongste 2002, 122) and one pit at site 5 (5KL32; s14.114) contained 544 g animal bone, 445 g pottery and several other finds (*ibid.*, 139).

Fig. 6.31 Location of pits and tentative pits at Zijderveld.
a: not excavated, b: houses, c: tentative pits, d: pits, e: drinking pools, f: possible (unlined) wells.

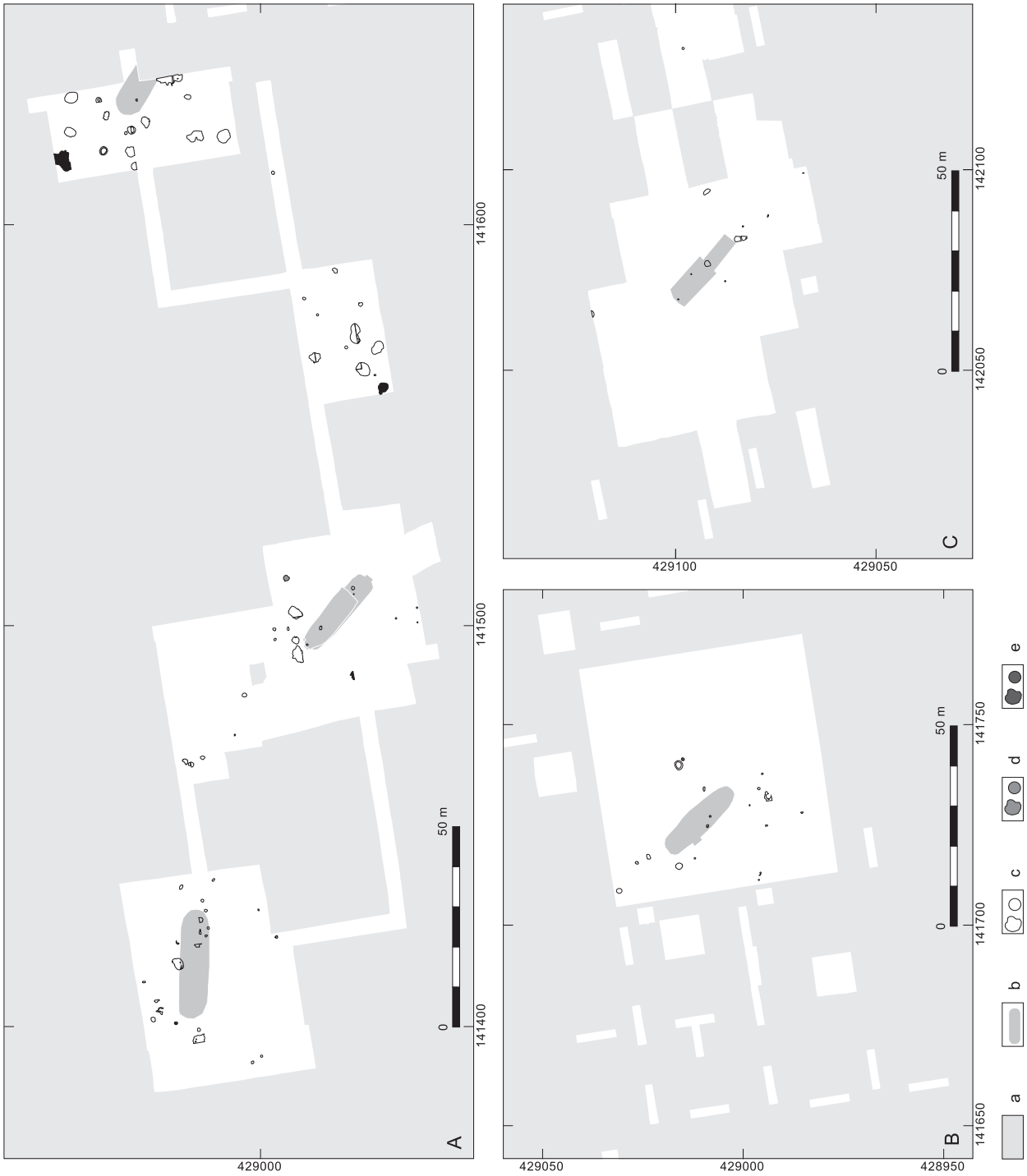

Fig. 6.32 Location of pits at Eigenblok sites 1 to 4 (A), 5 (B) and 6 (C).
a: not excavated, b: houses, c: pits, d: well, e: burnt areas.

This argues against an interpretation of (secondary) refuse pits for the majority of these pits. Their distribution does indicate that they occur frequently near houses, but as generally only small areas around the houses have been excavated, this cannot be interpreted as a true clustering (fig. 6.32). Moreover, at site 3 no house plan but various pits

could be identified, which also supports the interpretation that pits occur both near, and more distant from houses. Possibly, larger pits were preferably dug to the (north)west of the Eigenblok houses.

For the pits in the Dodewaard excavation, no preferred location in relation to the houses could be argued. The interpretation of Theunissen and Hulst (1999a, 148) that most pits are situated near the margins of the areas with the highest feature density is correct, but this apparent distribution may be influenced by the small width (< 30 m) of the excavated area. Like at Zijderveld and Eigenblok, the pits are relatively few in number and contained no or few finds (*loc. cit.*).

At the De Bogen excavations, similar patterns to those at Zijderveld, Dodewaard and Eigenblok could be documented (*supra*, esp. fig. 6.10). Pits were frequently encountered on house-sites, but showed no evident spatial relation to the nearby farmhouses (*contra* Hielkema, Brokke & Meijlink 2002, 189). Possibly, at spatial scales above that of the hypothetical house-sites, the larger pits show some clustering (*ibid.*, 159). Like at Zijderveld and Eigenblok, pits with many (> 500 g) recovered artefacts are scarce. Wells were mostly discovered outside the hypothetical house-sites and seem to cluster in certain parts of the landscape. Such clusters of wells could have a time-depth exceeding that of the Middle Bronze Age(-B) occupation phase currently under study.

At Wijk bij Duurstede, very few Middle Bronze Age pits are presently known, but these show a distinct clustering near two houses (see section 4.5.3, esp. fig. 4.26, C-D). These pits, again, contained few finds (Hessing 1991, 44; Appendix IV). The distribution of pits near Wijk bij Duurstede - De Horden house 3 correspond to the house in size and orientation. These properties, combined with the relatively exclusive occurrence of such pits near houses, allow one to postulate that pits and houses could be interrelated entities at this settlement site. The absence of such pit(cluster)s at the other Wijk bij Duurstede house-sites, indicates that pit(cluster)s were optional and not essential elements of Middle Bronze Age(-B) houses-sites.

The distribution of the pits at Lienden is relatively even and of a relatively low density (section 4.6; Appendix V, esp. fig. V.20). Consequently, only few pits can be identified on the two reliable Middle Bronze Age(-B) house-sites. At this site, it is not so much the placement, but the contents of the pits that stand out. Over 20 pits contained more than 500 g of artefacts. The location of these 'rich' pits is (weakly) correlated with the height of the micro-topographic landscape.

At Tiel - Medel 8, a similar situation was documented. A significant (*c.* 14 %) part of the pits at this site contained more than 500 g of archaeological remains, but only three pits were situated within hypothetical house-sites. For the modest overall numbers of pits recorded at the Tiel - Medel houses-sites, no preferred location in relation to the house-sites could be identified. Rather, clusters of Middle Bronze Age(-B) pits, some containing over 2.5 kg of artefacts, appear to be situated in areas outside the hypothetical house-sites. The same argument holds true for the ten possible Bronze Age wells at this site, of which three were situated within hypothetical house-sites (*supra*; De Leeuwe & Van Hoof 2007). Much like at De Bogen, the two wells situated within the house-site of house 8 appear to be part of a bigger cluster of wells, that reflects a use-life surpassing that of the Middle Bronze Age(-B) occupation period(s).

	pits few in nr few finds	pits many nos. few finds	pits many nos. many finds wells	
even or clustered beyond house-sites	Dodewaard	Eigenblok ?		Zijderveld
	Zijderveld	De Bogen	Lienden	De Bogen
	Eigenblok ?	Tiel ?	Tiel ?	Tiel
clustered on house-sites	Wijk bij Duurstede-De Horden	n.a.	n.a.	Eigenblok ?
none (?)	n.a.	n.a.	n.a.	Dodewaard
				Lienden
				De Horden

Table 6.2 Simplified interpretation of the different settlement sites by the numbers, contents and locations of pits and wells.

Most of the differences underlying the interpretation of the sites in table 6.2 are gradual, rather than categorical. Nonetheless, some properties are shared among several different settlement sites, whereas others occur only on a limited number or individual settlement site. The latter obervation may hint at local group decision making. From the above arguments and table 6.2 it is clear that pits generally contained few finds on all sites. Unfortunately, this low artefact content and generic shape of most pits does not allow interpretation of their original function with certainty (see section 5.7). The low artefact contents suggest that a (secondary) use of such pits as refuse dumps, like for some of the pits at Lienden and Tiel, was not the chief or sole incentive to dig these in the first place. At Zijderveld and Lienden, there are some indications that the density of pits was correlated to relative height of the micro-topographic landscape.[85] Additionally, pits cannot be proven to cluster (*i.e.* be preferentially located) near houses at most settlement sites. Only a single house-site at Wijk bij Duurstede - De Horden (fig. 6.46, C), provides a convincing exception to the rule (fig. 4.24).

Drinking pools for livestock could be identified at Zijderveld and Eigenblok, where they were situated close to the houses.[86] This data set is however too small to determine whether this proximity to the houses was a favoured property or not. The distribution of wells at De Bogen and Tiel has been interpreted as being steered by the presence of usable aquifers rather than by the presence or absence of house(-site)s. Consequently, the presence of wells on the Eigenblok and Zijderveld house-sites is likely to be 'coincidental'.

To conclude, it is evident that pits, pits secondarily used as refuse dumps, drinking pools and possible wells could occur close to houses, but there are no indications that they occured predominantly – let alone exclusively – near houses.[87] These features are accordingly best typified as house-site components, as opposed to house-site constituents.

6.4.5 High quality house-sites: multi-site VASO

In the beginning of this chapter the criteria for the evaluation of the applicability for VASO use for Middle Bronze Age house-sites were indicated (table 6.1). This allows to complement the analyses undertaken for the sites individually, with an analysis that uses only the best-quality house-sites from the various excavations. This may outline patterns of house-site ordering that are (only, or more visibly) present with house-sites of best suitability to VASO analysis. Consequently, here an analysis of the ten house-sites best suitable to VASO will be presented (fig. 6.34) to investigate whether any not yet previously patterns become visible. Based on the criteria in table 6.1, house-sites 2 to 4 from Zijderveld, house-sites 1 and 5 from Eigenblok, 1b and 2 from Dodewaard and De Horden house-site 9 were selected. As several options of comparable quality were open for the last two entries, it was decided to incorporate two house-sites from not yet listed settlement sites (house-site 2 from Enspijk and house-site 2 from Tiel-Medel 8).

Clearly, previously documented patterns can again be observed. Fences do not evidently defined house-sites, but seem to be part of larger systems that however frequently conform in orientation to the farmhouse or are orientated perpendicularly to it (fig. 6.34, C; g-i). The outbuildings occur in a zone around the farmhouse, with slight indications for more dense clusters near the farmhouses' long sides and left from the short side entrances (fig. 6.34, D; b-c). No far-reaching inferences can be made on the distributions of the other settlement site elements (fig. 6.34, d-g). This confirm the validity of the inferences made for the individual sites.

The correspondence between the multi-site VASO plot (fig. 6.34) and those of the individual sites (figs. 6.37 to 6.59), confirms that no distinct patterns that were potentially visible on high-quality sites but that have been obscured in single-site VASO plots have been overlooked. Moreover, the similarity between the multi-site VASO plots and the single-site VASO plots indicates that certain principles of house-site structuring were similar (or shared) on a supra-local scale.

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85 Possibly, the original (*e.g.* storage?) function of these pits benefited from a relatively higher position in relation to groundwater tables, which may explain why they are more commonly found on micro-topographic elevations.

86 Knippenberg & Jongste 2005, 63-69; Hielkema, Prangsma & Jongste 2002, 122, *cf.* section 5.7.

87 Figure 6.60 shows a VASO plot towards magnetic north with the distributions of pits, wells, drinking pools and those features possibly used secondarily as refuse pits at Zijderveld, Eigenblok, Wijk bij Duurstede - De Horden and Lienden. From this plot, the inter-site diversity (*e.g.* in types and presences of pits) is clear, but also the fact that only at Wijk bij Duurstede (fig. 6.60, C), pits cluster near the houses and were presumably part of a farmstead. See figure 6.10 for the situation at De Bogen.

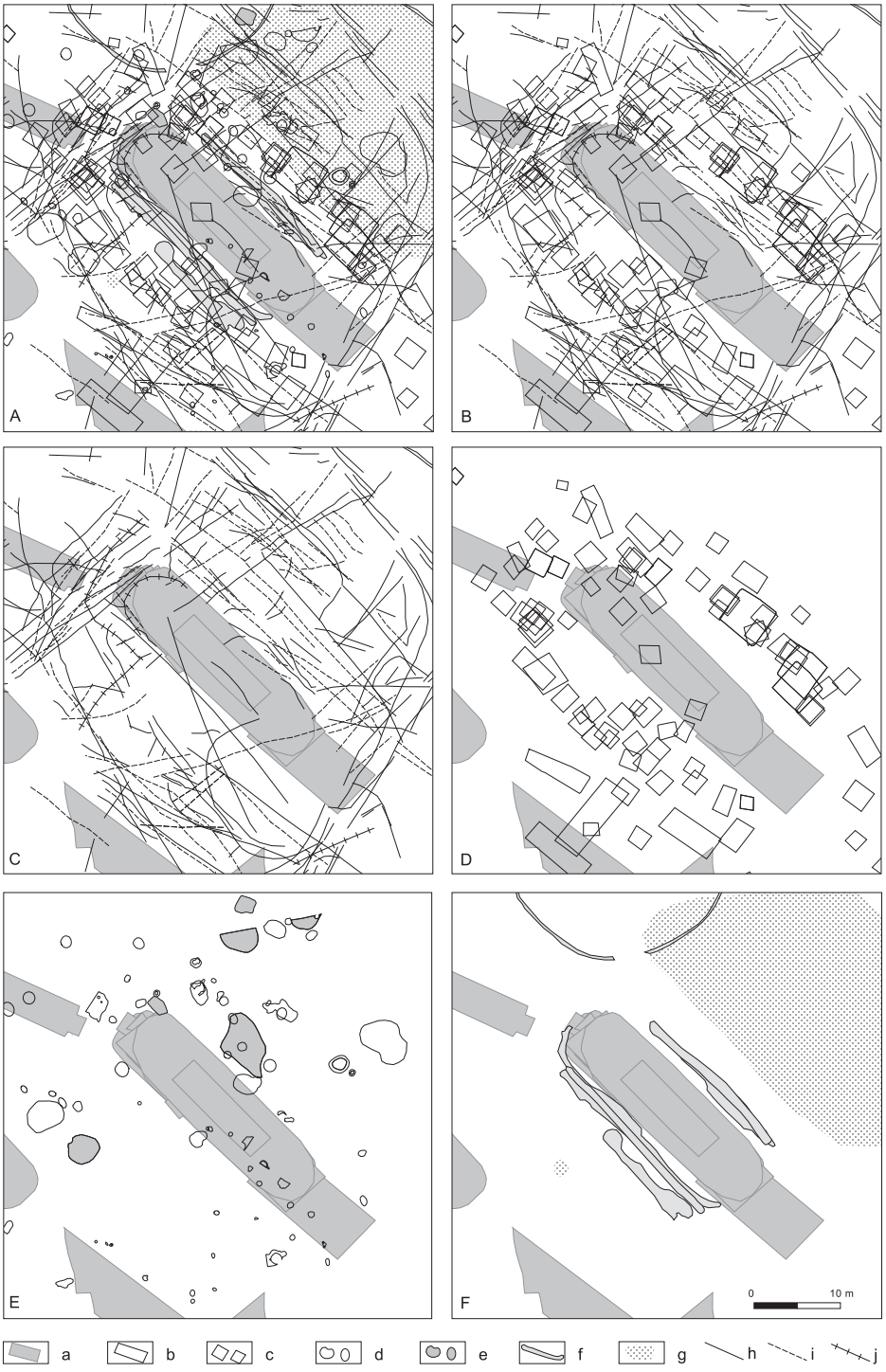

Fig. 6.34 Multiple (best quality) site VASO plot for all elements (A), houses, outbuildings, fences and palisades (B), houses, fences and palisades (C), houses and outbuildings (D), houses, pits and wells (E) and houses, ditches and hoof-imprints (F).

a: houses, b: barn/shed type outbuildings, c: granary-type outbuildings, d: pits, e: wells and watering holes, f: ditches, g: type-1a fences, h: type-2 fences, i: other fence types and palisades.

6.5 On the reality of Bronze Age farmsteads

The analyses of Bronze Age house-sites with a methodology of Visual Analysis of Spatial Overlays (VASO) have shown that several ordering principles can be outlined for Bronze Age house-sites. Moreover, I have shown that particular properties of house-sites (such as the clustering of outbuildings around houses or the avoidance of a general NE-SW orientation) were shared between different Middle Bronze Age settlement sites in the Dutch river area. Despite such sharing, I have shown that during the Middle Bronze Age various preferences in house-site structuring were open to manipulation at settlement site level in the Dutch river area (fig. 6.14). This suggests that while the *types* of conventions may have been more widely shared, such conventions were – presumably very consciously – articulated and materialized locally.[88]

Yet more importantly, do such conventions and local reflections thereof permit the use of the interpretative label 'farmstead' (table 3.2; section 3.2.1) for such structured house-sites? The conclusions offered below are initial answers to this question and the aim of defining the nature of Bronze Age house-sites, which is one of the major research questions of this study (Chapter 1). Unfortunately, the VASO methodology used in this chapter – in overstepping all problems of contemporaneity (section 6.3.4) – predominantly stresses shared patterns. Although this provides much needed insight into the generic nature of Bronze Age house-sites, it also results in an unwanted a-temporal perspective. By ignoring and simplifying diachronic variations, an undesirable 'flattening' of house-site time-depth has occurred. Therefore, a more diachronic perspective on the dynamics and life-histories of house-sites will be introduced in the next chapter (section 7.3.2). At this point, however, the information on the nature of Bronze Age house-sites in the river area from a more generic (and inherently temporally static) perspective is presented first.

The distribution of Middle Bronze Age farmhouses as a possible indicator of house-site size

In the distribution of the Middle Bronze Age farmhouses themselves, some information of Bronze Age landscape structuration is encoded. The overbuilding of houses by other Bronze Age farmhouses is nearly absent in the data for the Dutch central river area.[89] Well over 90 % of the Middle Bronze Age(-B) farmhouses were thus constructed at some distance from other houses at a given settlement site. I have indicated above that, save for a few exceptions, these houses generally all conform to a shared, single bi-axial system of orientation.[90]

In addition, I have argued that shared (house) orientation – even if it cannot be proved to reflect contemporaneity – at least reflects an importance not to disrupt (pre-)existing orientations of landscape structuring. In any case, the distances between the individual houses at a given settlement site do reflect deliberate inhabitant behaviour. The lack of overbuilding may indicate either that a certain distance had to be maintained in relation to co-existing farms when erecting a new one, or alternatively that it was considered unfavourable ('taboo'?) to construct new houses on former house-sites in this region (*cf.* Borna-Ahlkvist 2002, 195). Therefore, the minimum distance between houses may be a correlate of house-site size (table 6.3).

Excluding the two house-sites from Lienden, which are 560 m apart, for the remaining Middle Bronze Age(-B) house-sites in the Dutch river area a second house-site can be found between 10 to 80 m in over 86 % of the cases (mean value excluding Lienden *c.* 53 m; table 6.3).[91] This may indicate that the size of Middle Bronze Age-B house-sites could have varied in dimensions from 10 to 40 m (*c.* 23 m mean) distance from the house (wall). This corresponds well to the overall (ovoid, *c.* 50 by 70 m) distribution of the granaries around all houses (fig. 6.22, B).

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88 For example, one such shared general convention may be translated as 'house orientation is an important property that is shared by the houses within a settlement', but the selected orientation differs markedly and presumably deliberately *between* settlements. Similarly, a general shared convention such as 'granaries are preferably placed within 35 m from the farmhouse and correspond to it in orientation', is articulated locally in the preferred location of these outbuildings in relation to the house (fig. 6.14).

89 For the definition of 'overbuilding' see fig. 3.3; section 3.2.3. Enspijk - A2 (Ter Wal 2005b; section 4.3.3), and possibly De Bogen houses 45BH/45HH (section 4.4.3; Appendix III) and Tiel - Medel 8 house 8 (Van Hoof & Jongste 2007) may be interpreted as the exceptions to this rule.

90 Section 6.4.1. Exceptions may be house 2 at Enspijk (Ter Wal 2005b; section 4.3.4), house 1 at Eigenblok (section 4.3.5 and Appendix II) or house 3 at Tiel - Medel 8 (Van Hoof & Jongste 2007).

91 Frequency analysis shows that nearly 60 % of these houses are located at 10 to 50 m from another Middle Bronze Age farmhouse.

Consequently, based on the distribution of both other houses and possibly accompanying outbuildings, an area of 10 to 25 or even 40 m around the house walls is an acceptable size estimate for Middle Bronze Age-B house-sites.[92]

Moreover, the mean inter-house distance for the distribution of the Middle Bronze Age house-sites in the Dutch river area (*c.* 53 m) is half the distance frequently assumed for Middle Bronze Age house-sites to be situated apart (*c.* 100 m).[93] This indicates that a diffuse spread of house-sites – which is seen as characteristic for a settlement model of wandering farmsteads (section 3.3.2) – need not apply here.

Quite to the contrary, the relatively close proximity of houses, combined with their shared house-site properties (*e.g.* house orientation and placement of outbuildings) suggests that the Middle Bronze Age(-B) settlement pattern in the river area was one of multiple, closely spaced, interrelated (and/or contemporary) houses (*cf.* Meijlink 2002b, 803).

Although inter-house distances may provide a crude size-estimate for Middle Bronze Age(-B) house-sites, the shape of the Middle Bronze Age-B house-sites remains essentially unknown. The curved fences around the farmhouse at Eigenblok site 1 (fig. 6.40, A) fall within the size-limits suggested above, but it has been argued above that fences are not reliable indicators of house-sites.

site	house-site (hs)	min. distance 2nd (nearest) hs	min distance 3rd hs
Zijderveld	1	28	55
Zijderveld	2	28	106
Zijderveld	3	55	106
Zijderveld	4	160	165
Eigenblok	1	72	199
Eigenblok	2	72	129
Eigenblok	4	78	129
Eigenblok	5	78	212
Eigenblok	6.1	14	344
Eigenblok	6.2	14	366
De Bogen	28-4	74	463
De Bogen	28-1	74	359
De Bogen	45bh	35	37
De Bogen	45ah	31	35
De Bogen	45ch	31	37
De Bogen	29b2/3h	166	173
De Bogen	30b-eh	20	25
De Bogen	30gh	15	20
De Bogen	30ah	15	25
De Horden	1	35	38
De Horden	2ab	25	38
De Horden	3	25	33
De Horden	4/5	35	45
De Horden	6/7	66	67
De Horden	8	137	153
De Horden	9	68	90
De Horden	10	91	98
De Horden	11	185	196
De Horden	12	33	47
Dodewaard	1ab	23	56
Dodewaard	2	23	25
Tiel-Medel 8	1	33	46
Tiel-Medel 8	2	12	33
Tiel-Medel 8	3	12	46
Tiel-Medel 8	5	15	198
Tiel-Medel 8	6/7	15	218
Tiel-Medel 8	8	64	71
Lienden	15p	560	n.a.
Lienden	14d	560	n.a.

Table 6.3 Minimum distance in meters between Middle Bronze Age(-B) house-sites in the Dutch river area for the different settlement sites.

In addition, the ovoid shape of the outbuilding distribution in figure 6.22 should not be considered representative for the shape of the house-site. The different shapes of the outbuilding distributions per site (fig. 6.35) show that sufficient variation exists not to interpret the individual distributions as being identical in shape.[94] Evidently, some variation in the placement of outbuildings between different settlement sites may have been common, yet all still conformed to a more general distribution pattern for outbuildings on Bronze Age sites in the Dutch river area (section 6.4.2).

Furthermore, it is important to realize that the lack of knowledge on the shape of Middle Bronze Age(-B) house-sites is not a result of inadequate feature preservation or methodological issues. Had Middle Bronze Age-B farming communities wished to physically delimit their house-sites by means of earth-fast structures such as fences, palisades or ditches, the conditions of excavation would have allowed them to be recognized at most settlement

92 Based on the 10-40 m suggested by the house distribution and the 50 by 70 distribution corrected for a mean house width of 6 m and length of 20 m (see section 5.2.3.4; fig. 5.26).
93 Roymans & Fokkens 1991, 16 ('at least 100 m'); Theunissen 1999, 192 table 4.12 ('*c.* 100 m'); Jongste 2002b, 591 ('100-300 m').
94 Moreover, note how the elongated and narrow shape of the excavation at Dodewaard (fig. 6.35, F) determines (or distorts) the distribution.

sites.[95] The absence of structures intended principally to delimit Bronze Age farmsteads in the Dutch river area, needs to be taken at face value: they cannot be reconstructed because they were never there.[96]

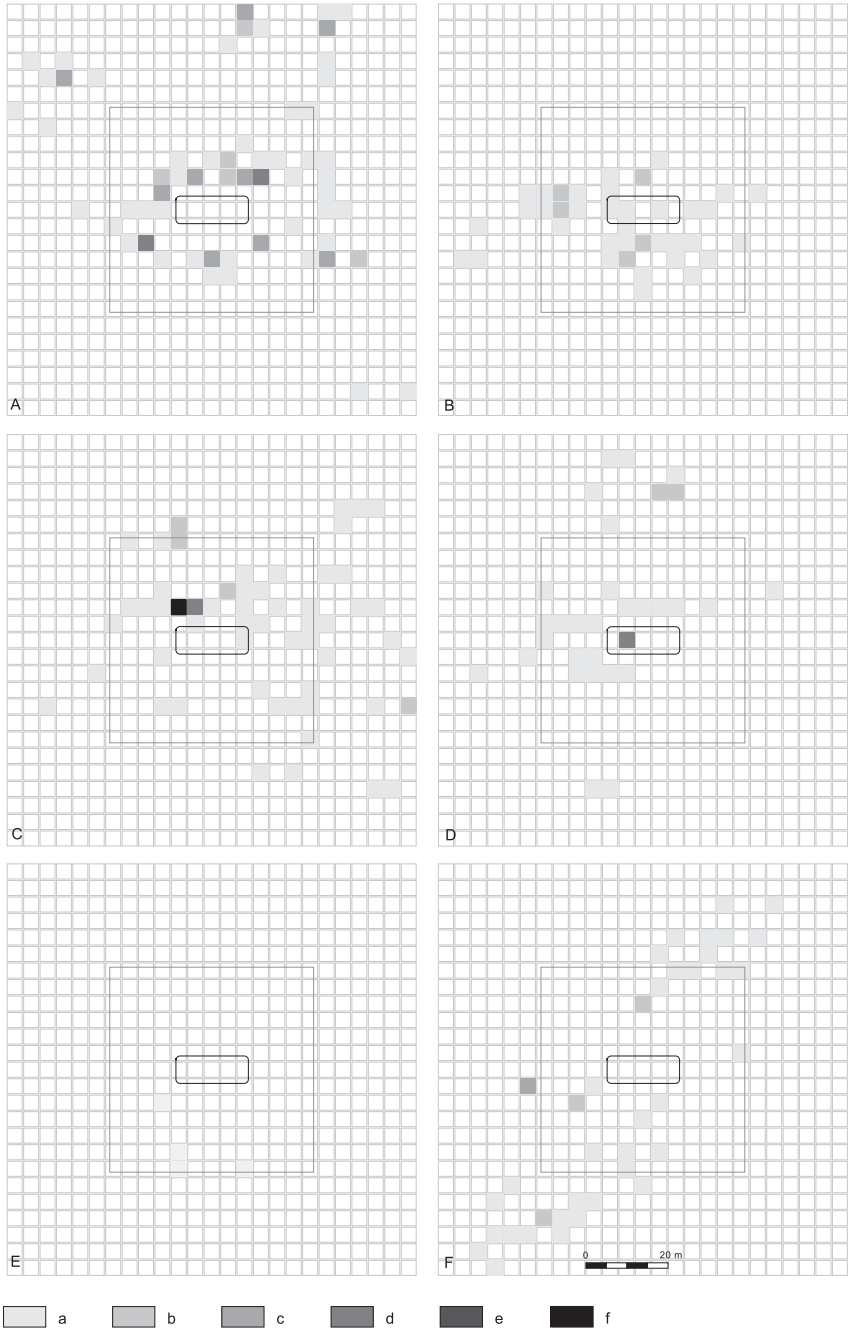

Fig. 6.35 Distribution of all outbuildings for the overlain Middle Bronze Age(-B) housesites of Zijderveld (A), Eigenblok (B), De Bogen (C), Wijk bij Duurstede (D), Lienden (E) and Dodewaard (F), plotted against a generic Bronze Age house and 50 by 50 m hypothetical house-site.
a: one outbuilding, b: two outbuildings, c: three outbuildings, d: four outbuildings, e: five outbuildings, f: six to ten outbuildings.

95 Only at Wijk bij Duurstede and at parts of Meteren - De Bogen, may feature preservation have been inadequate to preserve shallow stake postholes or shallow ditch features.

96 While fences frequently seem to respect (and thus reflect) areas directly around the houses, I have argued (section 6.4.3) that this was not their principal function and that they only *de facto* delimited house-sites. Accordingly, no exception is made for fences in this statement. See also Streiffert (2005, 4). Of course one has to allow for the possibility of house-site defining structures of no or low archaeological visibility such as vegetation (*i.e.* hedges), clearances (*cf.* Rapoport 1990, 147) or even (partly) notional boundaries (*cf.* Van Meijl 1993, 214; Whitelaw 2003 (1994), 225 or the Jewish *eruv* boundaries; Chapter 5, note 269).

Borderless house-sites: an association game

Having argued above that clear-cut archaeologically visible boundaries are not to be expected for Middle Bronze Age house-sites in the Dutch river area, establishing the possible contents of house-sites becomes a difficult task. Essentially, one has to determine meaningful spatial interrelations between houses and other settlement site elements without relying solely on proximity. For all possible house-site elements, their distribution in relation to houses must be checked with the general distribution across settlement site space and must furthermore be interpreted in light of the available evidence on their suspected function and the nature of the physical landscape within which the different elements are situated.

For the fences, it has already been suggested above that these can occur alone or in bundles both near, and more distant from the farmhouses. Some fence-lines share their orientation with nearby houses, which may hint at a deliberate interrelation. As the fences frequently continue beyond the estimated house-site size, it is plausible that a single or comparable set of (cosmological or physical?) structures guided the orientation of houses and fences alike. Although the orientation of fences and houses may have been mutually guided by one another in cases of close proximity, they are not mutually interdependent. In other words; whilst frequently spatially acknowledging each other, the distribution of fences and houses is essentially unrelated. Whereas in rare cases fences may have defined house-sites (*e.g.* Eigenblok house-site 1), fences predominantly served other purposes.

Several arguments have been forwarded to support the claim that houses and outbuildings were joint entities on house-sites and that outbuildings cluster near houses. I have shown that within the 50 by 50 m hypothetical house-site, as well as on larger spatial scales, outbuildings predominantly cluster near houses. Beyond a zone of 10 to 40 m from the farmhouses, outbuildings occur infrequently and are predominantly situated near the excavation extents. I have suggested that the majority of them are best interpreted as belonging to unexcavated house-sites. Furthermore, not only do outbuildings cluster near the houses, but they also have been shown to be predominantly orientated parallel to one of the farmhouse's axes of orientation. Lastly, in respecting the placement, orientation and the type of the outbuildings when rebuilding it,[97] the Bronze Age builders have left us tangible evidence that they themselves had distinct mental templates of 'where what kind of outbuilding should be built'. Outbuildings are, like the houses proper, the unique settlement site element that define and constitute house-sites. No other settlement site element is found in so frequent and so exclusive an association with Middle Bronze Age farmhouses as are granary-type outbuildings.

Following from the above, pits are best regarded as farmstead components, as they are no quintessential part of Middle Bronze Age(-B) house-sites. Whereas at some settlement sites more pits are documented than at others, pits containing large quantities of artefacts are generally scarce.[98] In the Dutch river area, pits on Middle Bronze Age(-B) settlement sites show a distribution that is generally *not* related to the presence of houses.[99] Possibly, pits were at some sites dug somewhat more frequently at the highest parts of the micro-topographic landscape, but at other sites their distribution appears rather even.[100] Some drinking pools for cattle have been found close to the houses, but are (yet) too few in numbers to assume this to be their preferred location.[101]

The distribution of wells is also better interpreted as being related to preconditions of the physical landscape (*i.e.* the presence of useable aquifers) as opposed to being related to house-sites. Whereas some wells were found quite close-by to houses, the fact that at other sites wells cluster in specific locations (with clusters spanning multiple archaeological periods) suggests that their distribution was not steered by the presence of a house. To reverse the argument, for 90 % of the Middle Bronze Age(-B) houses in the Dutch river area no wells were found at short (< 20 m) distances. Additionally, the presence of (older) palisades and funerary structures at short distances from

97 Possibly also when rebuilding an entire house-site? *cf.* fig. 6.12, C.

98 *Contra* Fokkens 2005a, 362. Contrary to this statement (*loc. cit.*), pits do not facilitate house-site recognition.

99 Save for one significant exception; Wijk bij Duurstede - De Horden house-site 3 (fig. 4.24).

100 The evidence from Tiel, and possibly also from Lienden, suggests that pits that contained more finds are actually situated more distant from house(-site)s. Note in this respect that the pits at De Horden house-site 3 (fig. 4.24) also contained very few finds.

101 For livestock herding sedentary communities, it may have been favorable that the condition of the water in the drinking pools, as well as the condition of the animals making use of it, could be easily checked on a regular basis, by locating drinking pools next to the houses.

houses has been documented.[102] As with the cattle hoof-imprints, ard-marks and several other phenomena whose contemporaneity is often unclear, it is impossible to ascertain whether these phenomena were ever conceived of as being part of the house-site (*cf.* section 8.2.3.3). In addition, various activity areas and yet unrecognized agricultural structures are likely to have been part of Bronze Age house-sites.[103] It is equally important to note that various phenomena that may be expected, have not been found (section 5.9). Especially the locations of craft-production, most notably ceramic production and metal-working, were either not situated near the houses or have not yielded archaeologically visible traces.

To conclude, a final possible correlate (proxy) for Middle Bronze Age(-B) houses-sites can be forwarded. This concerns artefact distributions. Where Middle Bronze Age(-B) house-sites in the river area have not been affected by severe later anthropogenic or fluvial erosion, they appear to be characterized by large quantities of artefacts. For instance, the well preserved vegetation horizon with embedded finds of the upper (*i.e.* Middle Bronze Age-B) occupation level at Eigenblok site 5 contained over 207 kg of domestic refuse.[104]

The distribution of this debris was not uniform. Rather, the house plan forms the centre of a distribution pattern that mimics properties of the house in shape and orientation (fig. 6.36). As pottery was the dominant find category in weight for Eigenblok house-sites 5 and 6 (65.2 and 71.6 % respectively; Jongste 2002a, 28 table 1.2), the pottery distribution plots for these two sites are here considered representative for the overall distribution. Their dimensions fit well with the assumed dimensions of house-sites postulated above.

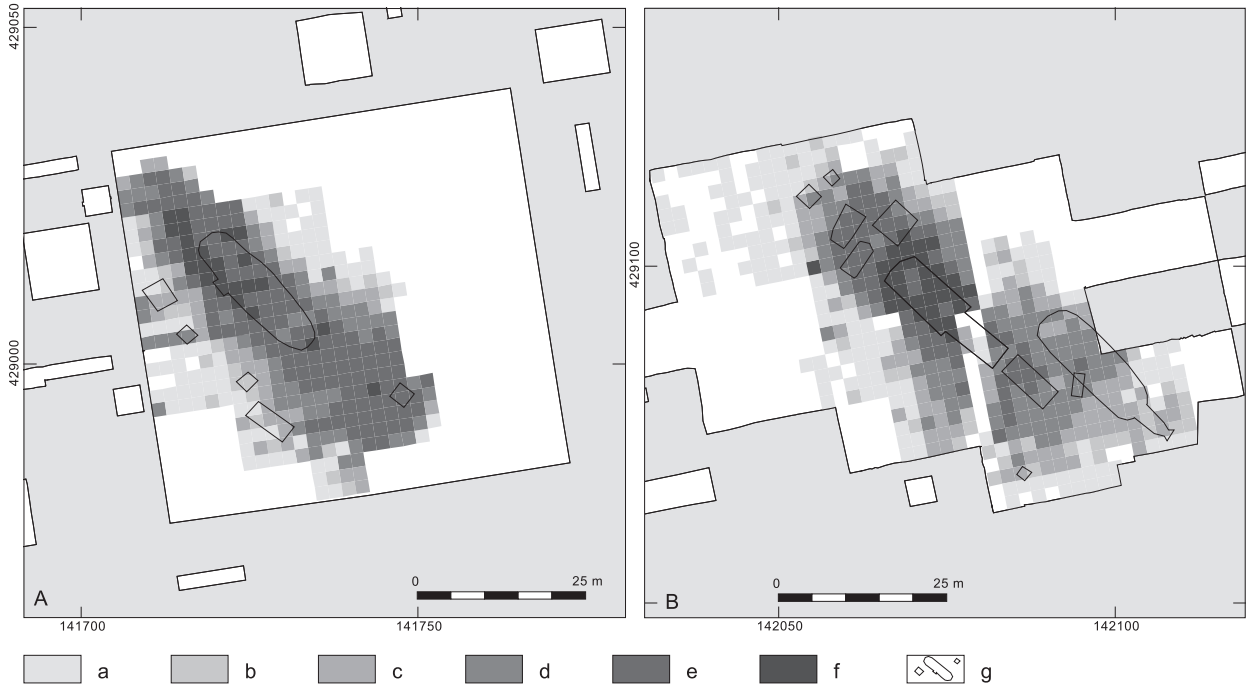

Fig. 6.36 Pottery distribution plots for Eigenblok sites 5 (A) and (B), after Bloo & Schouten (2002, 257 fig. 4.16 and 261 fig. 4.18).
a: 0-30 g, b: 30-50 g, c: 50-140 g, d: 140-360 g, e: 360-1 kg, f: 1-4.5 kg, g: houses and outbuildings.

102 On palisades see section 5.5. On the interrelation between houses and funerary sites see section 8.2.3.3; Bourgeois & Arnoldussen 2006; Bourgeois & Fontijn 2008 and Meijlink 2008.
103 *Cf.* references in note 3.
104 As the main excavated area was *c.* 230 square meters, this approximates 900 g per square meter. For Eigenblok site 6 similar values can be calculated (lower levels negligible, upper level features contain 1.4 % in weight, upper find-layer the remainder of 197 kg; *c.* 340 g / square m; based on Jongste 2002a, 28 table 3.28 and original documentation). Note that the table headings for tables 6.26 and 6.28 (*op. cit.*) are incorrect.

This strong correlation between artefact densities and house-sites observable at Eigenblok (fig. 6.36) may also be valid for other settlement sites with adequate preservation conditions.[105] At Dodewaard, the artefact densities could only be plotted by trench, but show a similar relation (Theunissen & Hulst 1999a, 149 fig. 4.21a). Additionally, it means that such house-sites may be more easily recognized during campaigns of prospective archaeological coring (*cf.* section 2.7).[106] The excavations at Zijderveld and Tiel illustrate that absence of occupation layers which are rich in archaeological materials, does not preclude the presence of various house-sites with good feature preservation (section 4.2.3; Van Hoof & Jongste 2007).

In the sections above I have argued that only houses and outbuildings can be considered house-site constituents. Fences and pits are (optional) house-sites components, whose distribution is generally not limited to house-sites. In addition, artefact densities have been suggested to correlate to Middle Bronze Age(-B) house-sites. These results show that (somewhat disappointingly) few structuring principles for Middle Bronze Age house-sites can be outlined. Based on the VASO results, Bronze Age house-sites are characterized mainly by house-outbuilding interrelations. It may be challenged whether this is 'enough' or 'meaningful enough' house-site structuring to merit the use of an interpretative label such as a farmstead. Essentially, this is a terminological matter for archaeologists amongst themselves to debate. However, I will argue later-on (section 8.2.2) that to Bronze Age farmers, 'farmsteads' entailed more than just physical or conceptual interrelations between houses and outbuildings.[107]

The results presented in this chapter on the systematic analysis of Bronze Age house-site structuring in the river area, should be complemented by more qualitative analysis of house-site structuring (Chapter 4; section 8.2.2), but should also take problems of chronology and archaeological visibility into account.

First, it must be stressed that the observable patterns (as yet) only apply to Middle Bronze Age-B house-sites, since no clear-cut Middle Bronze Age-A house-sites are presently known (see section 5.2.2). Rather than simply dismissing this observation as attributable to an inadequate data set, I feel we should reverse the argument. Evidently, Middle Bronze Age-A house-sites do not consist of similarly recognizable constituents (houses, outbuildings, fences), or they are of a structure and spatial distribution that we, for whatever reasons, fail to detect. Perhaps not dissimilar (or even related to?) the emergence of the regular Middle Bronze Age-B longhouse from the 15th century onward, house-sites with structured spatial relations between houses and outbuildings do not occur prior to the start of the Middle Bronze Age-B. A related phenomenon may occur in the ensuing Late Bronze Age period. For example, at Tiel - Medel 8 it could be shown that – despite relatively well-recognizable house plans and even larger numbers of easily recognizable outbuildings – no house-site ordering similar to that of the preceding Middle Bronze Age-B occupation phase could be indicated.[108] Both observations suggest that the house-site ordering documented in this chapter was a veritable Middle Bronze Age-B system of landscape usage, that presumably differed significantly from that of preceding and ensuing archaeological periods (*cf.* Arnoldussen & Fontijn 2006; Chapter 7).

Second, the limits of archaeological detectability should be stressed once more. Middle Bronze Age house-sites were first and foremost zones of domestic (and) agricultural productivity (*cf.* Abrahams 1991, 83-83; Voorhorst 1996, 14). To describe such areas of entwined social and technical activities, Ingold (1993, 158) coined the term 'taskscapes'. Unfortunately, of the (daily and seasonally different) activities presumably carried out in it (*e.g.* milking, crop-, fodder- or manure processing, hide-, wood- and stone-working, textile production and food-processing *et cetera*), only artefacts, some cattle hoof-imprints and various features whose former origins escape us, remained. Nonetheless, Bronze Age house-sites were multi-purpose activity zones, of which unfortunately only a palimpsest image of their spatial and functional components can be studied from an archaeological perspective.

It has become clear that commonly held notions of what prehistoric farmsteads may have looked like, may have been overly steered by the use of sub-modern farmsteads as analogies. The methodology forwarded in this chapter allows to use the available data for Bronze Age house-sites themselves, rather than indirect sources, to

105 But see also the more complex situation at Lienden (Appendix V, esp. figs. V.21 and V.22).

106 It is thus no coincidence that Eigenblok sites 1 to 4, which were discovered during prospective coring, have nearly all yielded Middle Bronze Age(-B) house plans (see Van Zijverden 2002a; Appendix II).

107 Based the role of the house-site within the structured nature of the wider environment around the houses as well as the range of activities taking place at farmsteads, whose importance is here not discussed in detail (see section 8.2.2).

108 Compare the VASO plots for the Middle (figs. 6.54 and 6.55) to those for the Late Bronze Age (figs. 6.57 and 6.58) at Tiel - Medel 8.

qualitatively compare Bronze Age house-sites in order to outline common patterns. Some of these observations, differ distinctly from established views.[109] The presence of delimiting features such as fences or ditches, a rectangular lay-out and barn/shed-type outbuildings that characterize (sub)modern farmsteads, could not be documented for Middle Bronze Age farmsteads in the river area. That Bronze Age farmers themselves nonetheless perceived the importance of having a structured house-environment, could be concluded from the observed rebuilding of houses and, more frequently, granary-type outbuildings on the near same spot with the near same orientation. Therefore, the view of Dutch Middle Bronze Age(-B) societies as being focused on 'having everything in its right place' (*cf.* Arnoldussen & Fontijn 2006, 308; Fontijn 2007, 79-81), seems in any case to apply to the placement of outbuildings in relation to farmhouses. It is this interrelation that must – for now – be viewed as the essential archaeological characteristic of Bronze Age farmsteads. Hopefully, this limited interpretation of the structure of Bronze Age farmsteads can be extended in the future and refined by additional specific research.

109 *Cf.* sections 1.4; 3.2.2; 6.3.1.

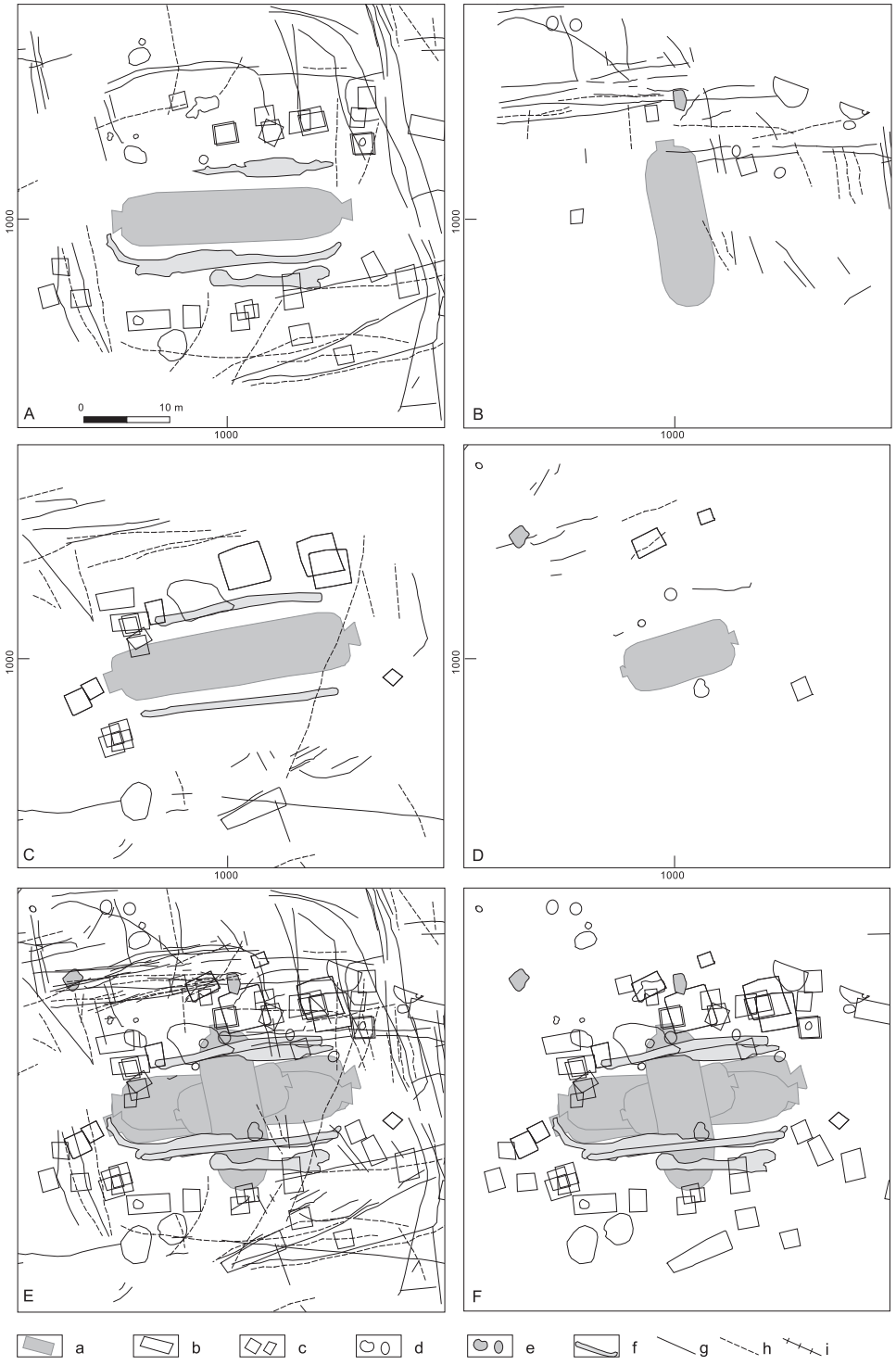

Fig. 6.37 VASO plot towards magnetic north for Zijderveld house-sites 1 (A), 2 (B), 3 (C) and 4 (D) and the VASO plot for all elements (E) and the houses, outbuildings, ditches, pits and wells (E).

a: houses, b: barn/shed-type of outbuildings, c: granary-type of outbuilding, d: pits, e: wells, f: ditches, g: type-1a fences, h: type-2 fences, i: other types of fences.

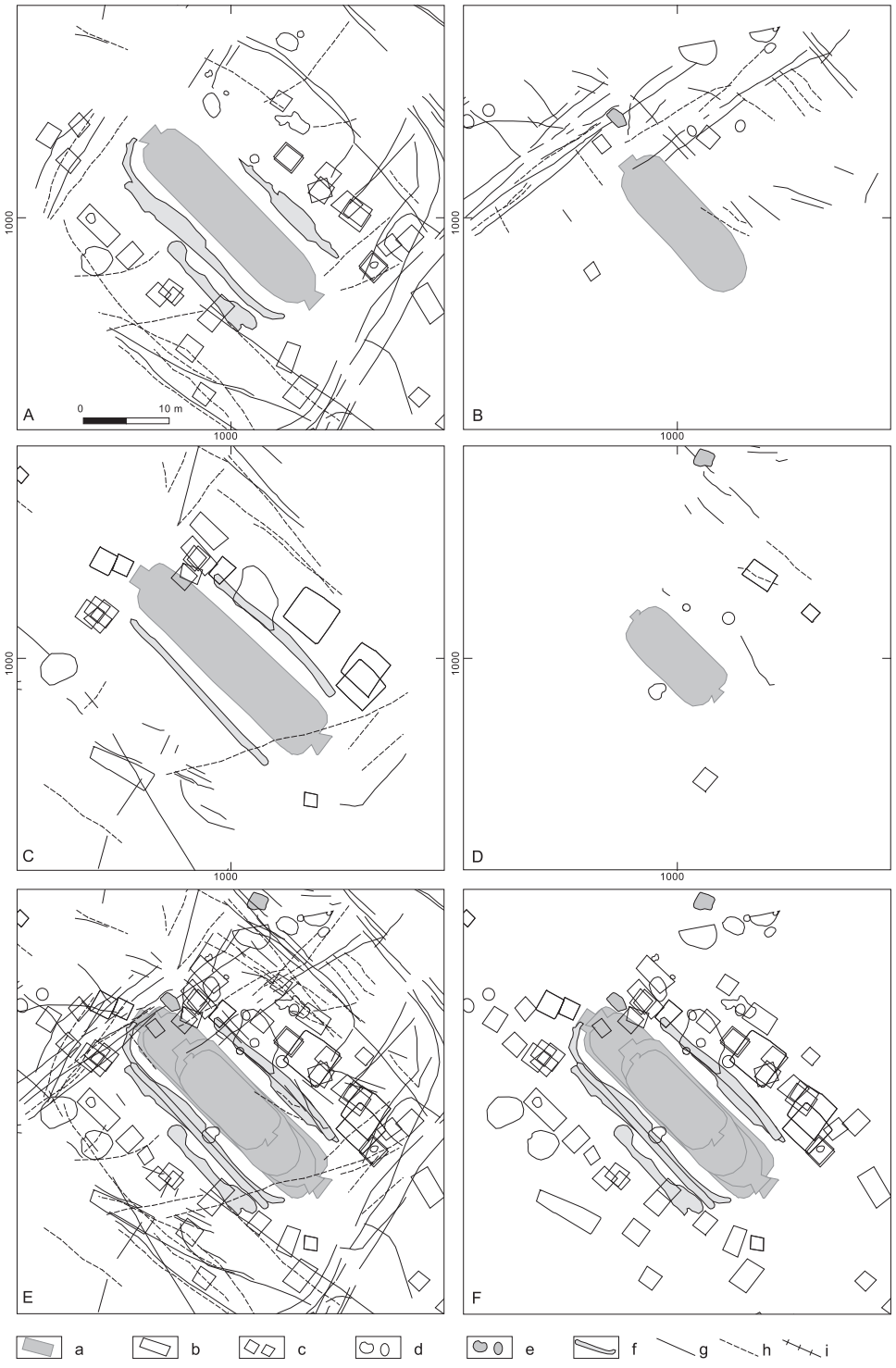

Fig. 6.38 Rotated VASO plot for Zijderveld house-sites 1 (A), 2 (B), 3 (C) and 4 (D) and the VASO plot for all elements (E) and the houses, outbuildings, ditches, pits and wells (E).

a: houses, b: barn/shed-type of outbuildings, c: granary-type of outbuilding, d: pits, e: wells, f: ditches, g: type-1a fences, h: type-2 fences, i: other types of fences.

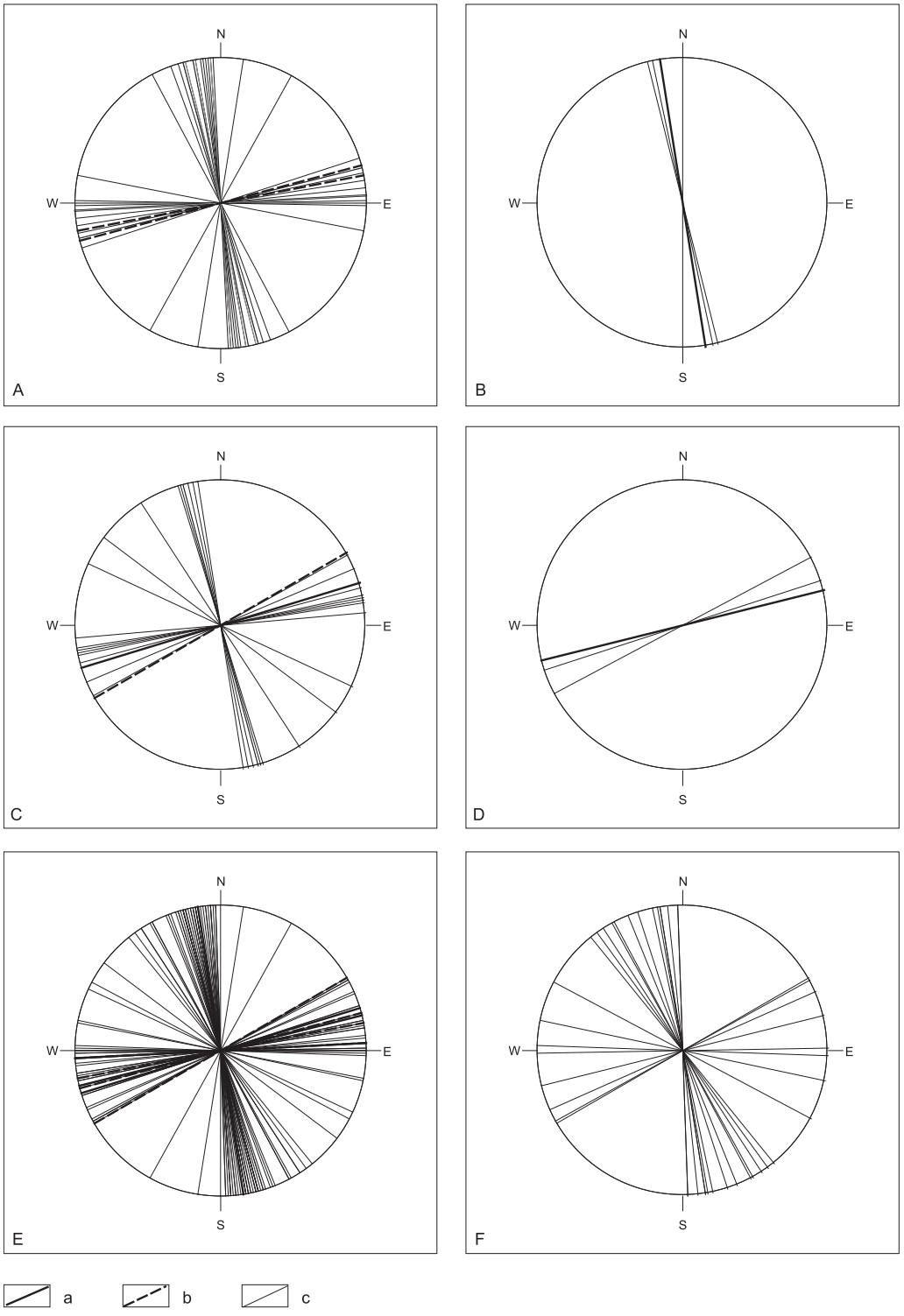

Fig. 6.39 Wind-rose diagrams for Zijderveld house-sites 1 (A), 2 (B), 3 (C) and 4 (D), all house-sites combined (E) and of the outbuildings not part of the house-sites (F).

a: houses, b: barn/shed-type outbuildings, c: granary-type outbuildings.

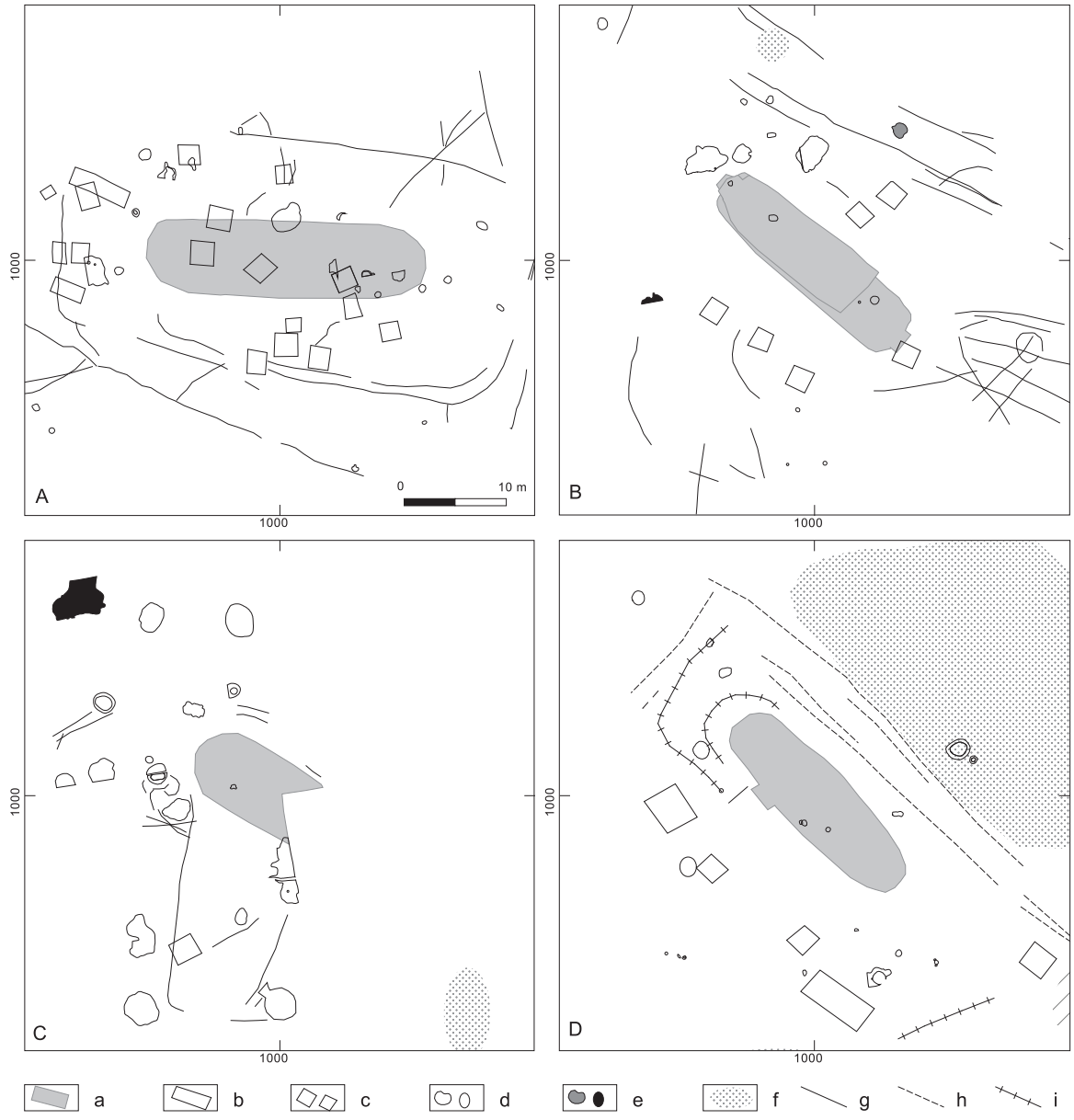

Fig. 6.40 VASO plot towards magnetic north for Eigenblok house-sites 1 (A), 2ab (B), 4 (C), 5 (D), 6a (E), 6b (F) and the VASO plot for all elements (G) and the houses, outbuildings, pits and wells (H).

a: houses, b: barn/shed-type of outbuildings, c: granary-type of outbuilding, d: pits, e: wells (light shade) and burnt patches (dark shade), f: cattle hoof-imprints, g: type-1a fences, h: type-2 fences, i: other types of fences.

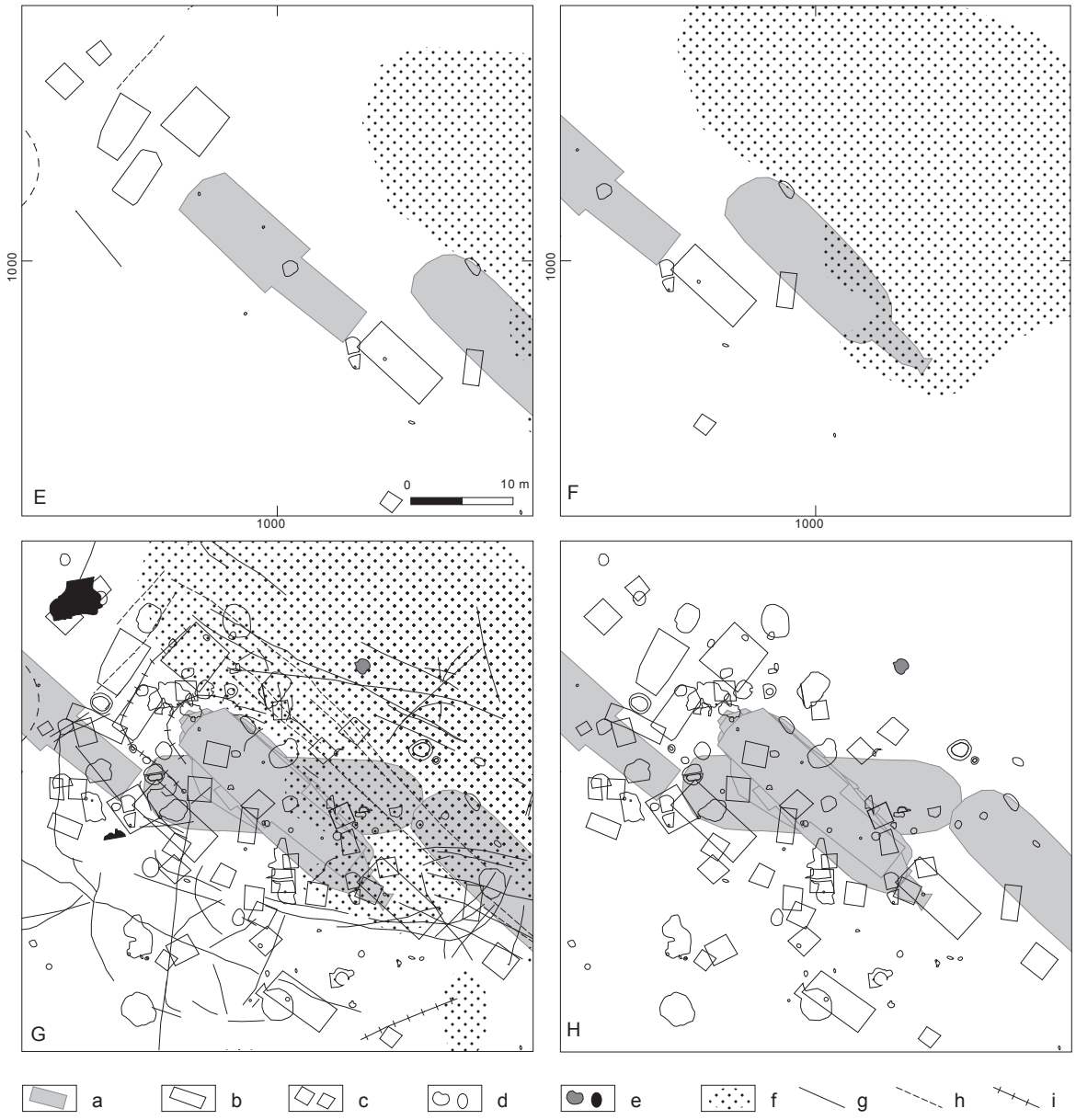

Fig. 6.40 (continued) VASO plot towards magnetic north for Eigenblok house-sites 1 (A), 2ab (B), 4 (C), 5 (D), 6a (E), 6b (F) and the VASO plot for all elements (G) and the houses, outbuildings, pits and wells (H).

a: houses, b: barn/shed-type of outbuildings, c: granary-type of outbuilding, d: pits, e: wells (light shade) and burnt patches (dark shade), f: cattle hoof-imprints, g: type-1a fences, h: type-2 fences, i: other types of fences.

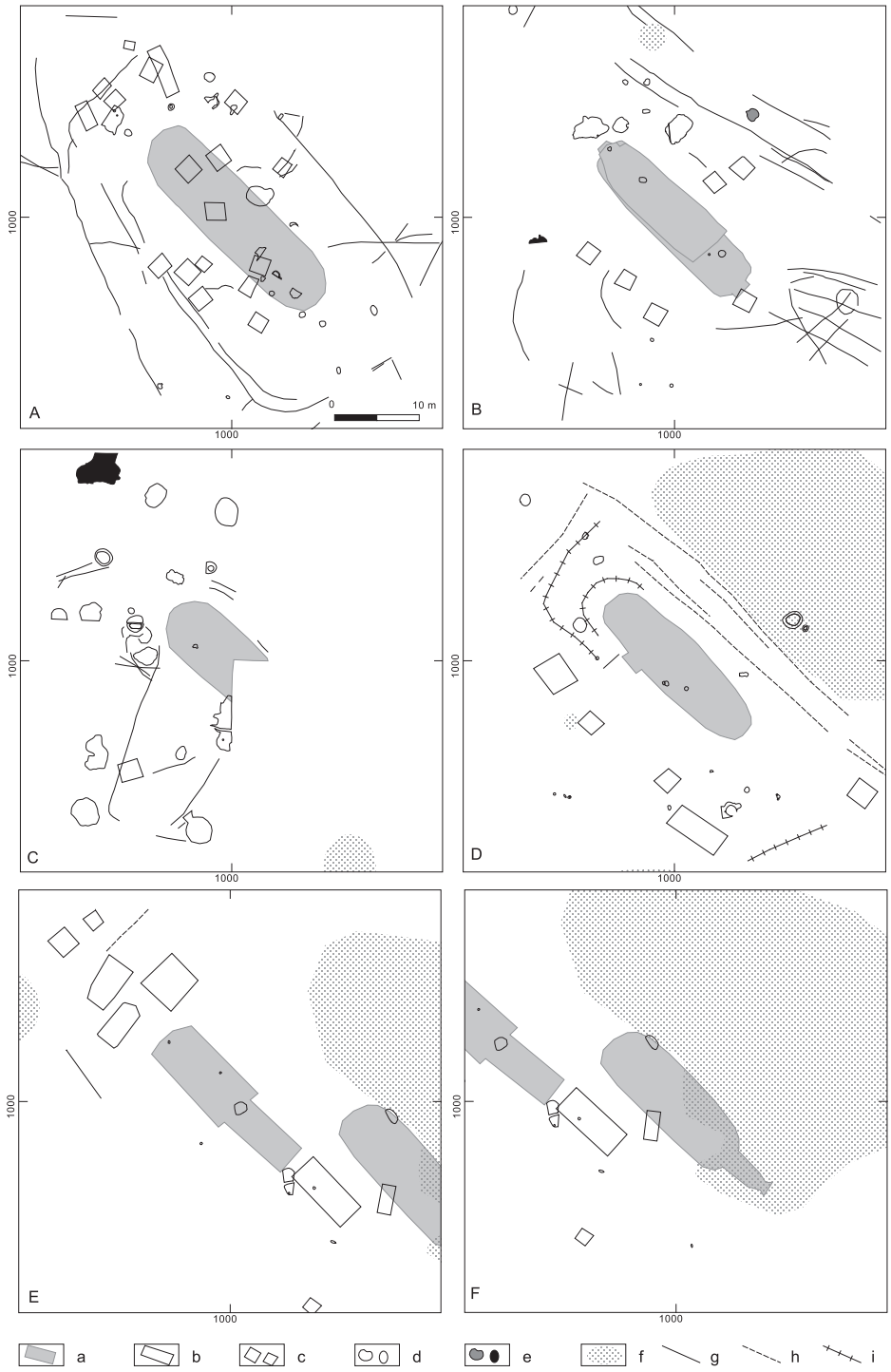

Fig. 6.41 Rotated VASO plot for Eigenblok house-sites 1 (A), 2ab (B), 4 (C), 5 (D), 6a (E), 6b (F) and the VASO plot for all elements (G) and all minus the hoof-imprints and burnt patches (H), the houses, outbuildings, fences, pits, wells and burnt patches (I), the houses and outbuildings (J), the houses and fences (K) and the houses, pits, wells and burnt patches (L).

a: houses, b: barn/shed-type of outbuildings, c: granary-type of outbuilding, d: pits, e: wells (light shade) and burnt patches (dark shade), f: cattle hoof-imprints, g: type-1a fences, h: type-2 fences, i: other types of fences.

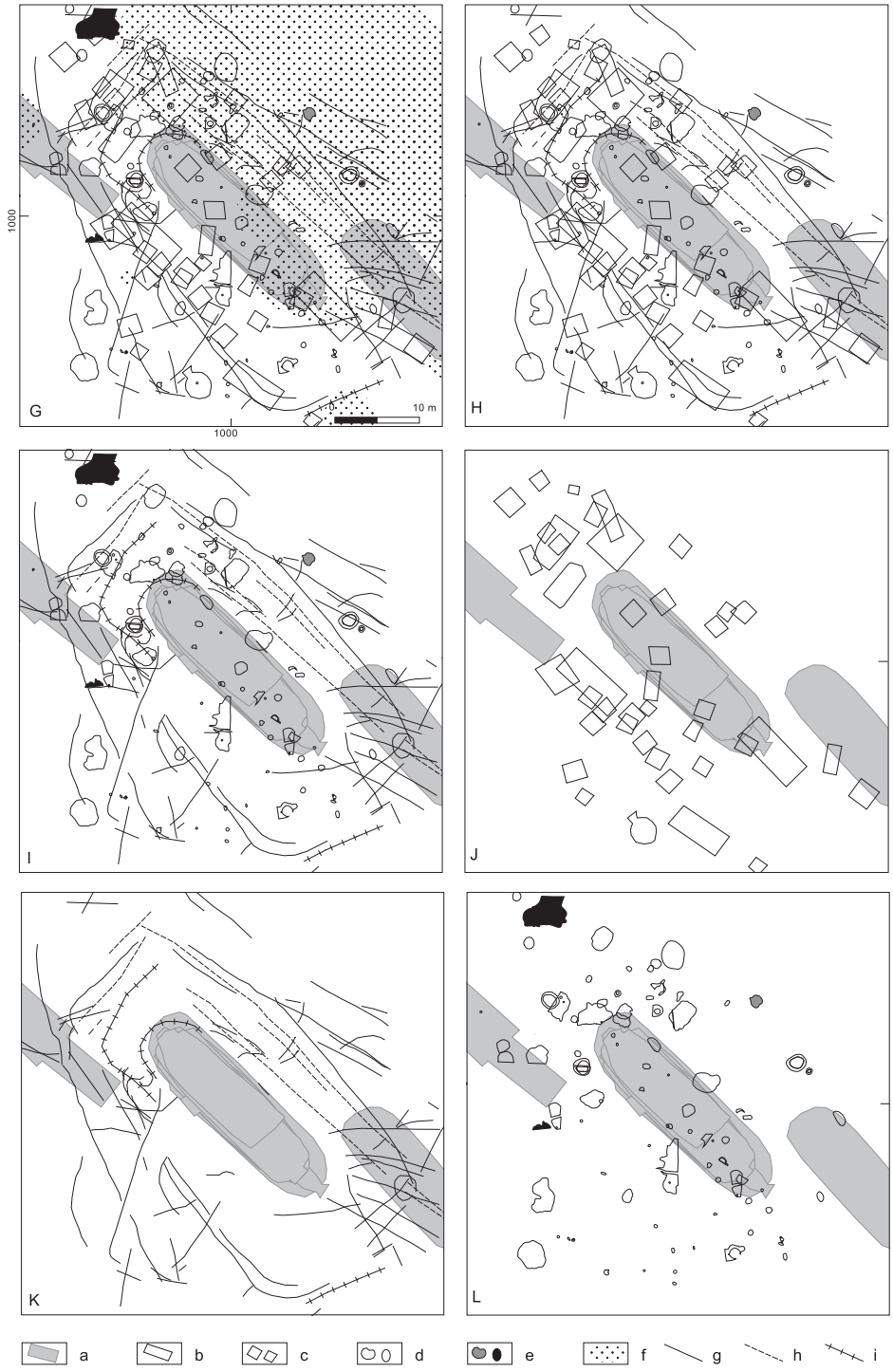

Fig. 6.41 (continued) Rotated VASO plot for Eigenblok house-sites 1 (A), 2ab (B), 4 (C), 5 (D), 6a (E), 6b (F) and the VASO plot for all elements (G) and all minus the hoof-imprints and burnt patches (H), the houses, outbuildings, fences, pits, wells and burnt patches (I), the houses and outbuildings (J), the houses and fences (K) and the houses, pits, wells and burnt patches (L).

a: houses, b: barn/shed-type of outbuildings, c: granary-type of outbuilding, d: pits, e: wells (light shade) and burnt patches (dark shade), f: cattle hoof-imprints, g: type-1a fences, h: type-2 fences, i: other types of fences.

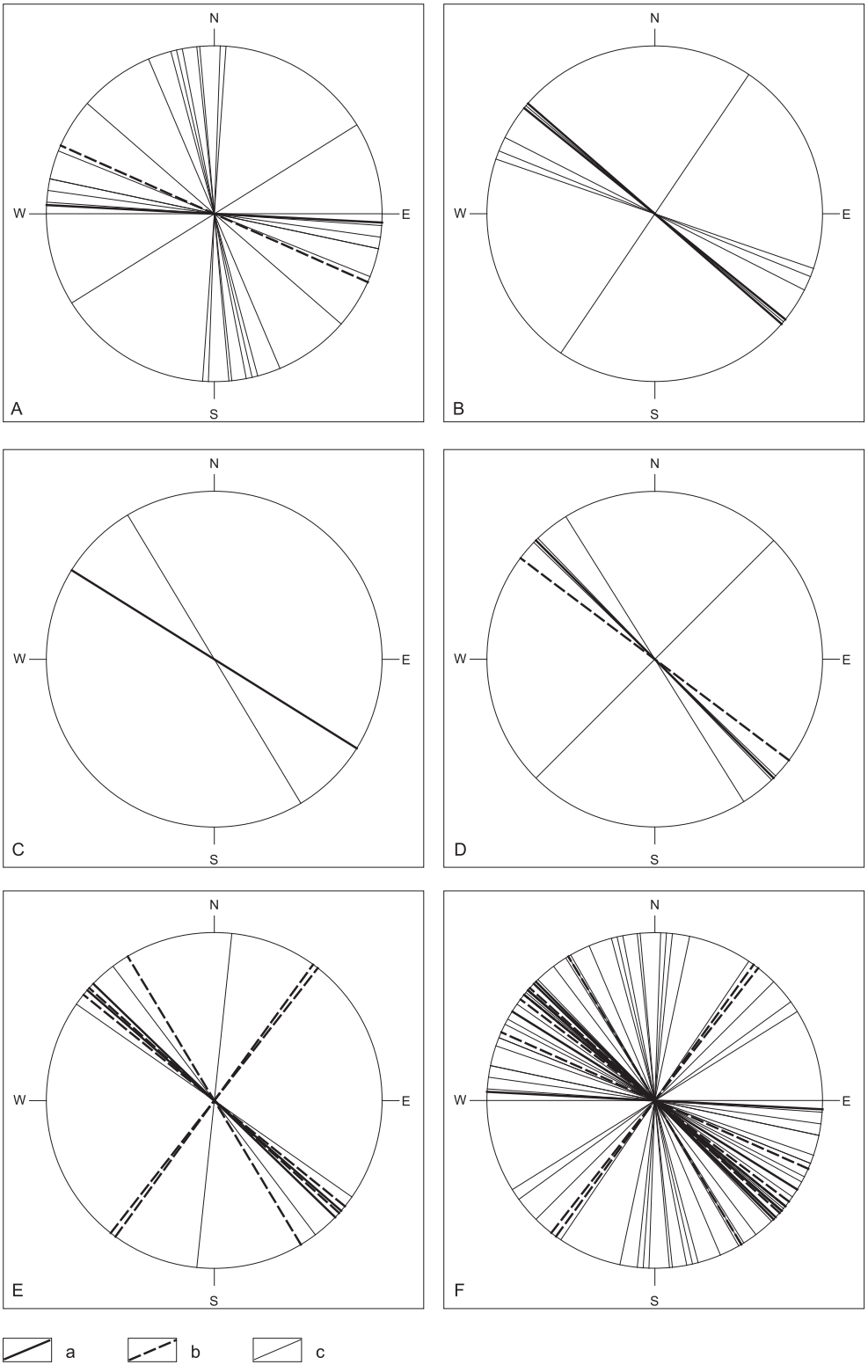

Fig. 6.42 Wind-rose diagrams for Eigenblok house-sites 1 (A), 2ab (B), 4 (C), 5 (D), 6ab (E) and all house-sites combined (F).
a: houses, b: barn/shed-type outbuildings, c: granary-type outbuildings.

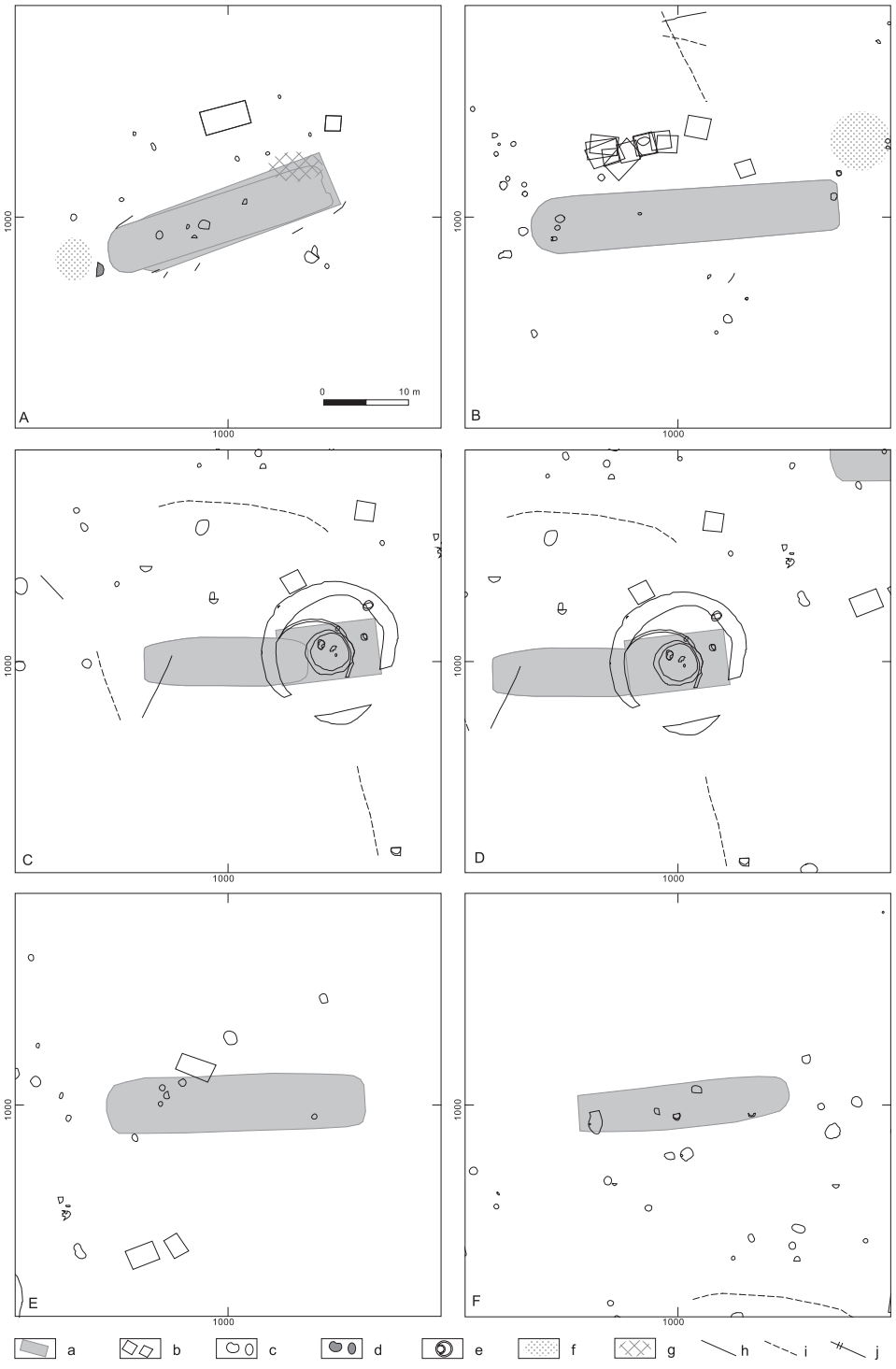

Fig. 6.43 VASO plot towards magnetic north for De Bogen house-sites 28-4CH (A), 28-1AH (B), 45BH (C), 45HH (D), 45AH (E), 45CH (F), '45DH' (G), 29B2/3H (H), '29AH' (I), 30BH-EH (J), 30GH (K), 30AH (L) and the VASO plot for all elements (M) and the houses, fences and palisades (N), the houses and outbuildings (O), the houses, pits and funerary sites (P) and the houses and hoof-imprints and ard-marks (Q).
a: houses, b: outbuildings, c: pits, d: wells, e: funerary site, f: cattle hoof-imprints, g: ard-marks, h: type-1a fences, i: type-2 fences, j: palisades.

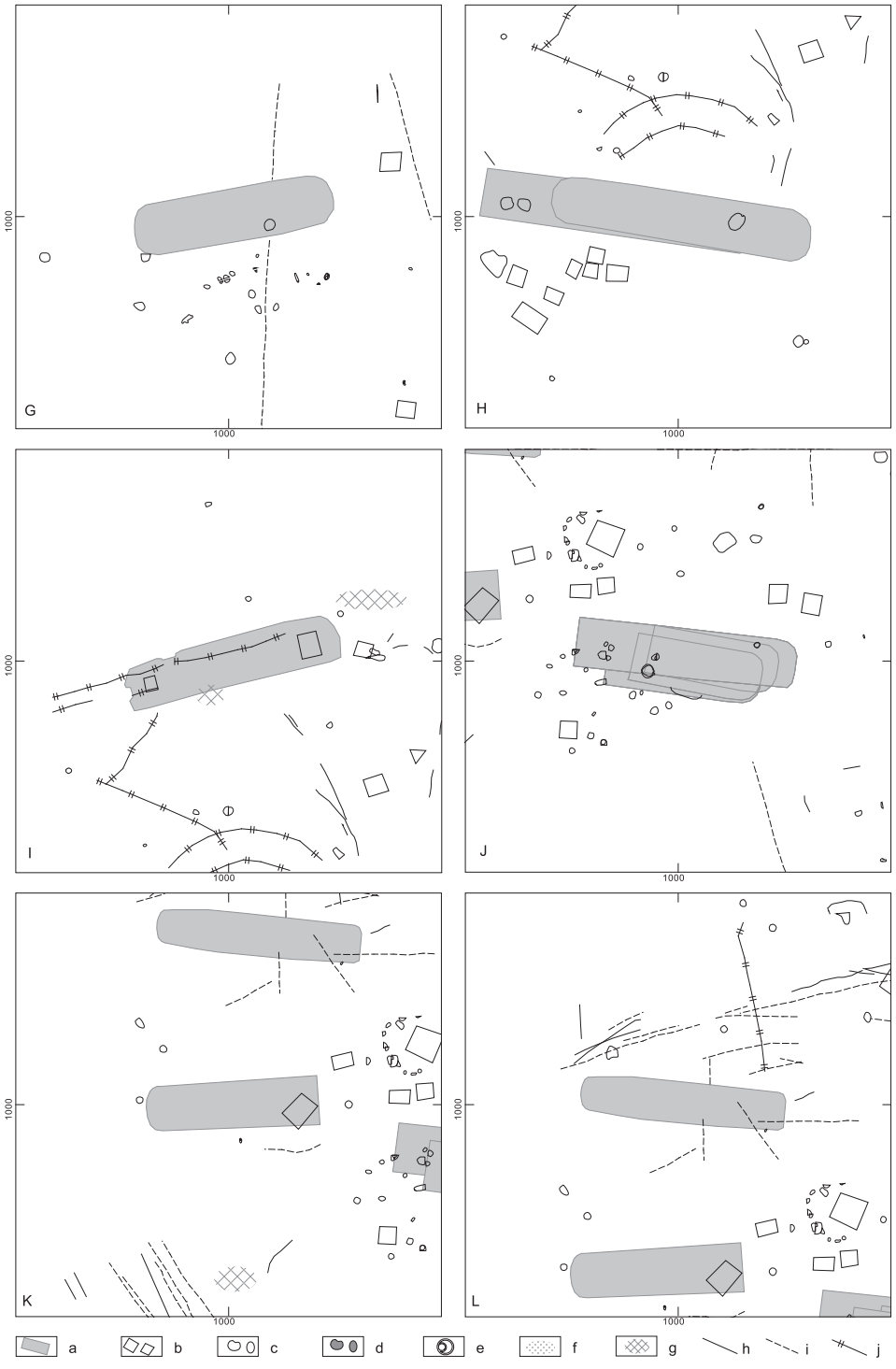

Fig. 6.43 (continued) VASO plot towards magnetic north for De Bogen house-sites 28-4CH (A), 28-1AH (B), 45BH (C), 45HH (D), 45AH (E), 45CH (F), '45DH' (G), 29B2/3H (H), '29AH' (I), 30BH-EH (J), 30GH (K), 30AH (L) and the VASO plot for all elements (M) and the houses, fences and palisades (N), the houses and outbuildings (O), the houses, pits and funerary sites (P) and the houses and hoof-imprints and ard-marks (Q).
a: houses, b: outbuildings, c: pits, d: wells, e: funerary site, f: cattle hoof-imprints, g: ard-marks, h: type-1a fences, i: type-2 fences, j: palisades.

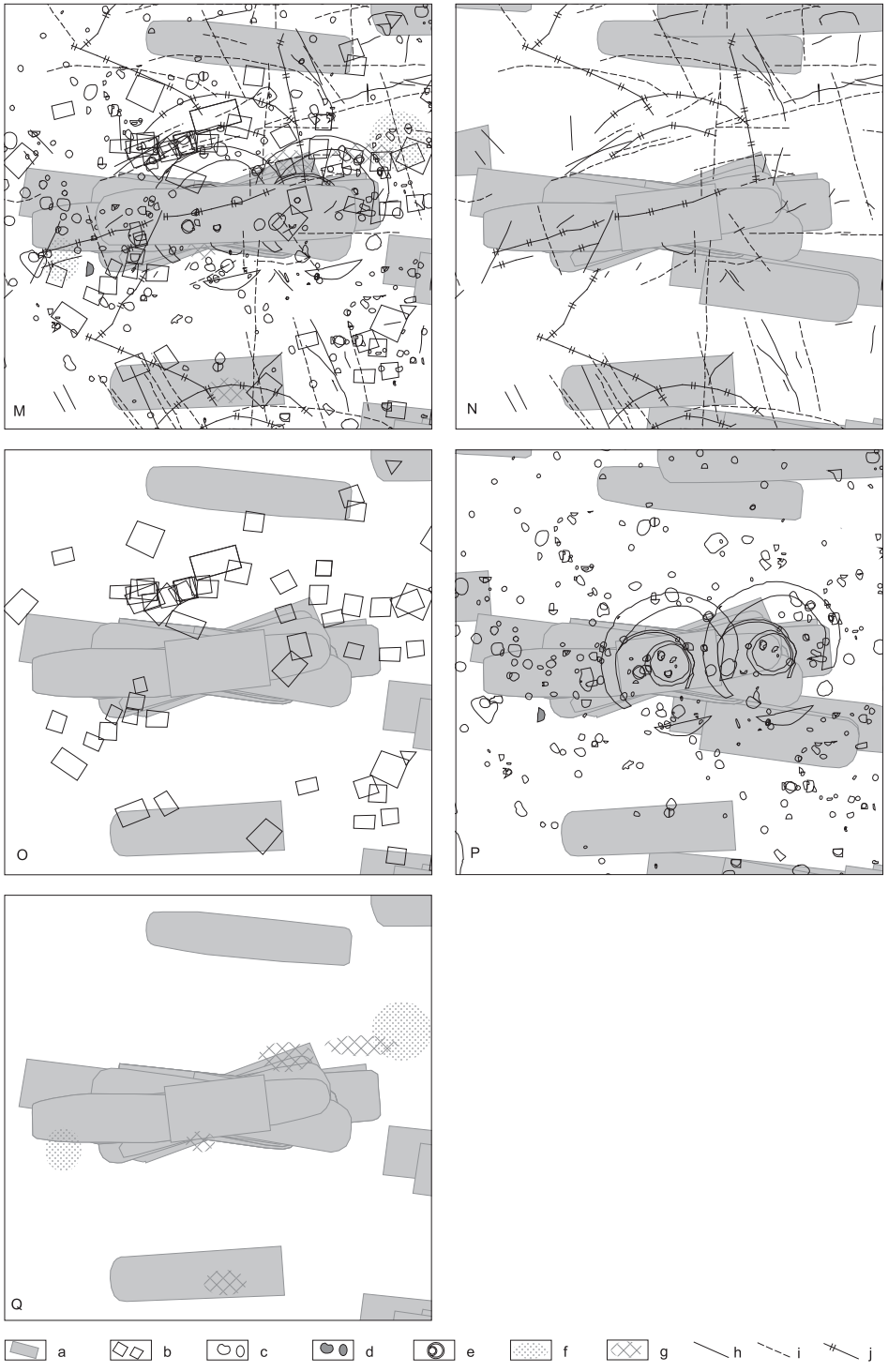

Fig. 6.43 (continued) VASO plot towards magnetic north for De Bogen house-sites 28-4CH (A), 28-1AH (B), 45BH (C), 45HH (D), 45AH (E), 45CH (F), '45DH' (G), 29B2/3H (H), '29AH' (I), 30BH-EH (J), 30GH (K), 30AH (L) and the VASO plot for all elements (M) and the houses, fences and palisades (N), the houses and outbuildings (O), the houses, pits and funerary sites (P) and the houses and hoof-imprints and ard-marks (Q).
a: houses, b: outbuildings, c: pits, d: wells, e: funerary site, f: cattle hoof-imprints, g: ard-marks, h: type-1a fences, i: type-2 fences, j: palisades.

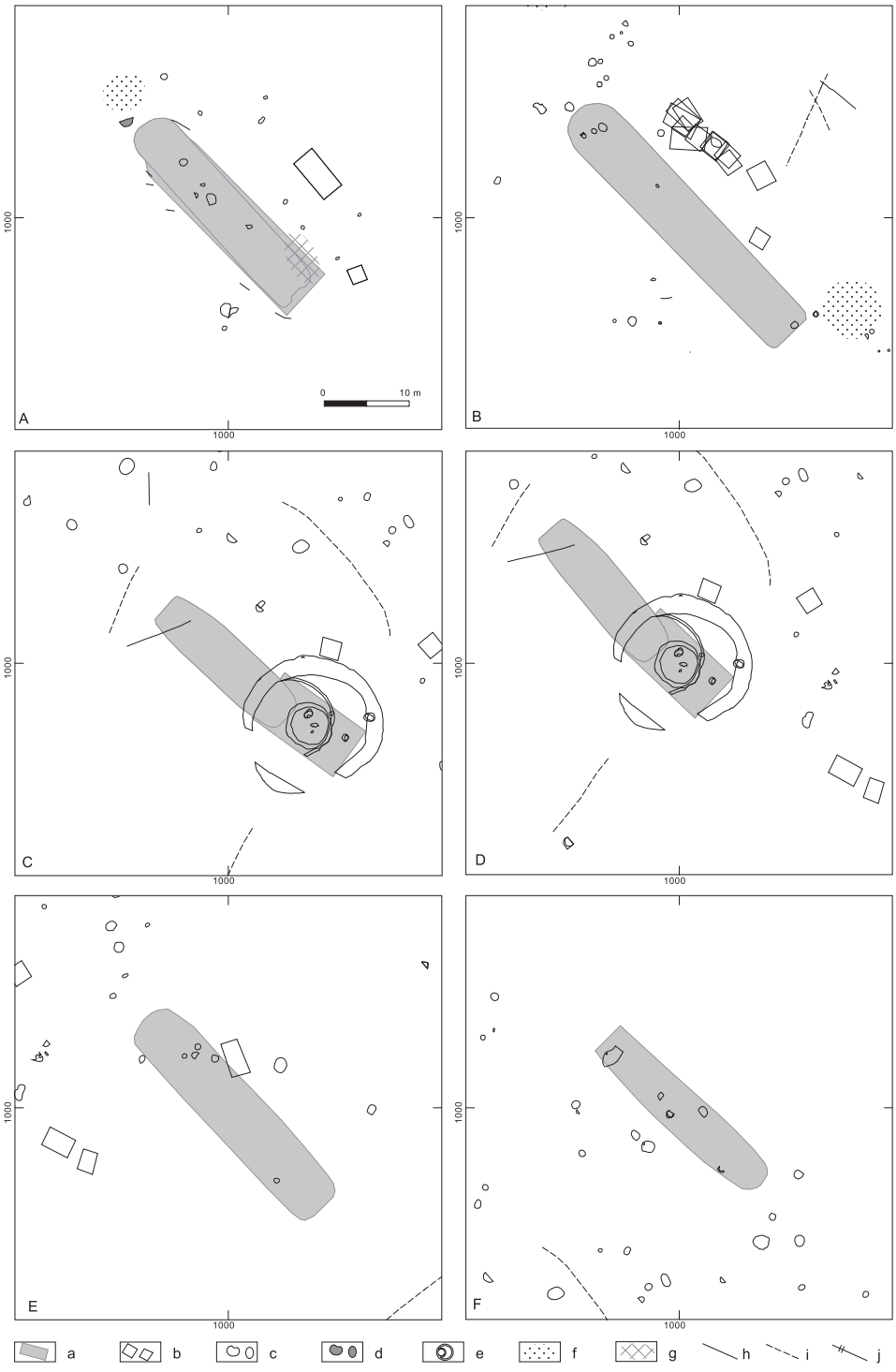

Fig. 6.44 Rotated VASO plot for De Bogen house-sites 28-4CH (A), 28-1AH (B), 45BH (C), 45HH (D), 45AH (E), 45CH (F), '45DH' (G), 29B2/3H (H), '29AH' (I), 30BH-EH (J), 30GH (K), 30AH (L) and the VASO plot for all elements (M) and the houses, fences and palisades (N), the houses and outbuildings (O), the houses, pits and funerary sites (P) and the houses and hoof-imprints and ard-marks (Q).

a: houses, b: outbuildings, c: pits, d: wells, e: funerary site, f: cattle hoof-imprints, g: ard-marks, h: type-1a fences, i: type-2 fences, j: palisades.

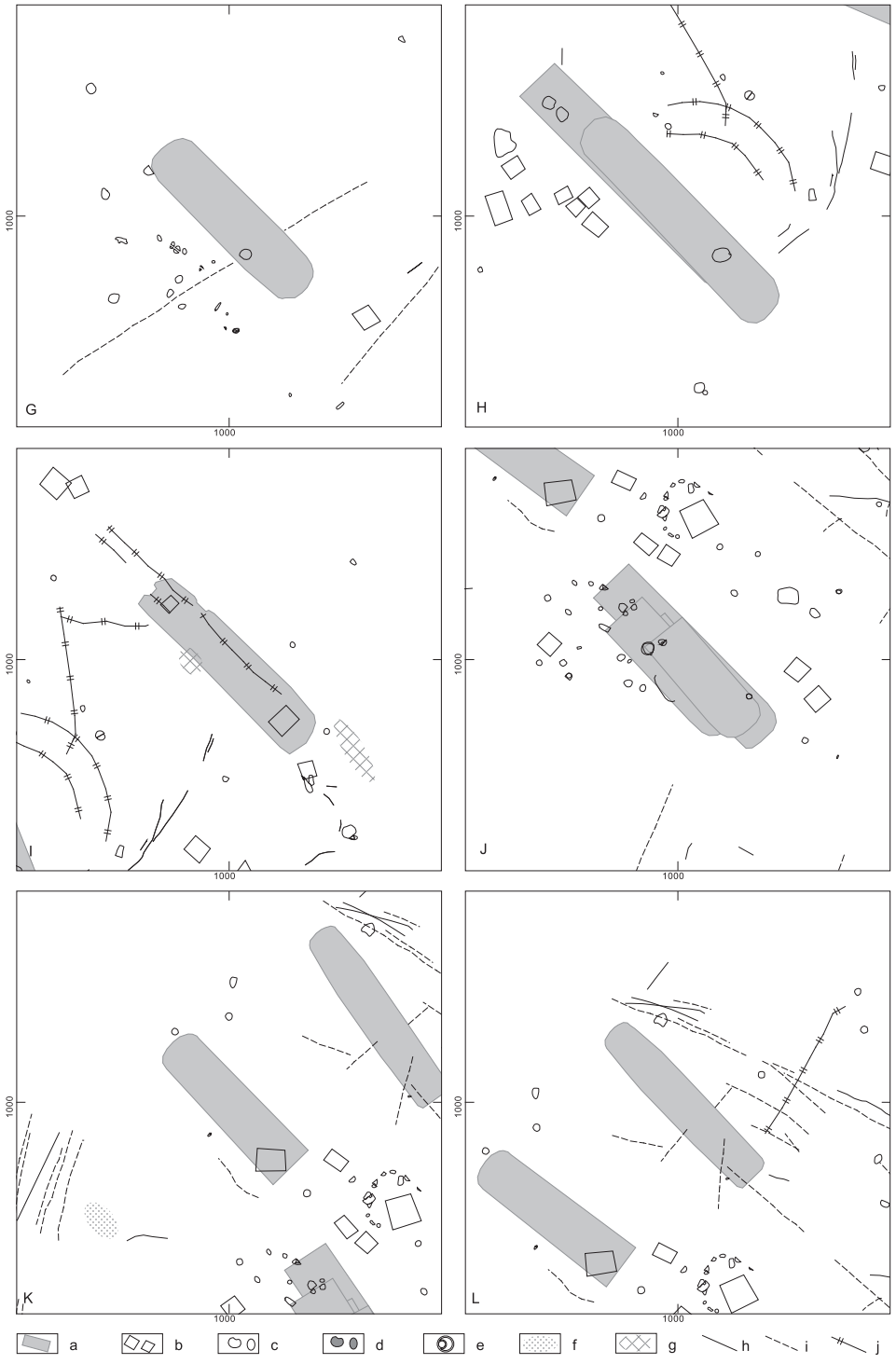

Fig. 6.44 (continued) Rotated VASO plot for De Bogen house-sites 28-4CH (A), 28-1AH (B), 45BH (C), 45HH (D), 45AH (E), 45CH (F), '45DH' (G), 29B2/3H (H), '29AH' (I), 30BH-EH (J), 30GH (K), 30AH (L) and the VASO plot for all elements (M) and the houses, fences and palisades (N), the houses and outbuildings (O), the houses, pits and funerary sites (P) and the houses and hoof-imprints and ard-marks (Q).
a: houses, b: outbuildings, c: pits, d: wells, e: funerary site, f: cattle hoof-imprints, g: ard-marks, h: type-1a fences, i: type-2 fences, j: palisades.

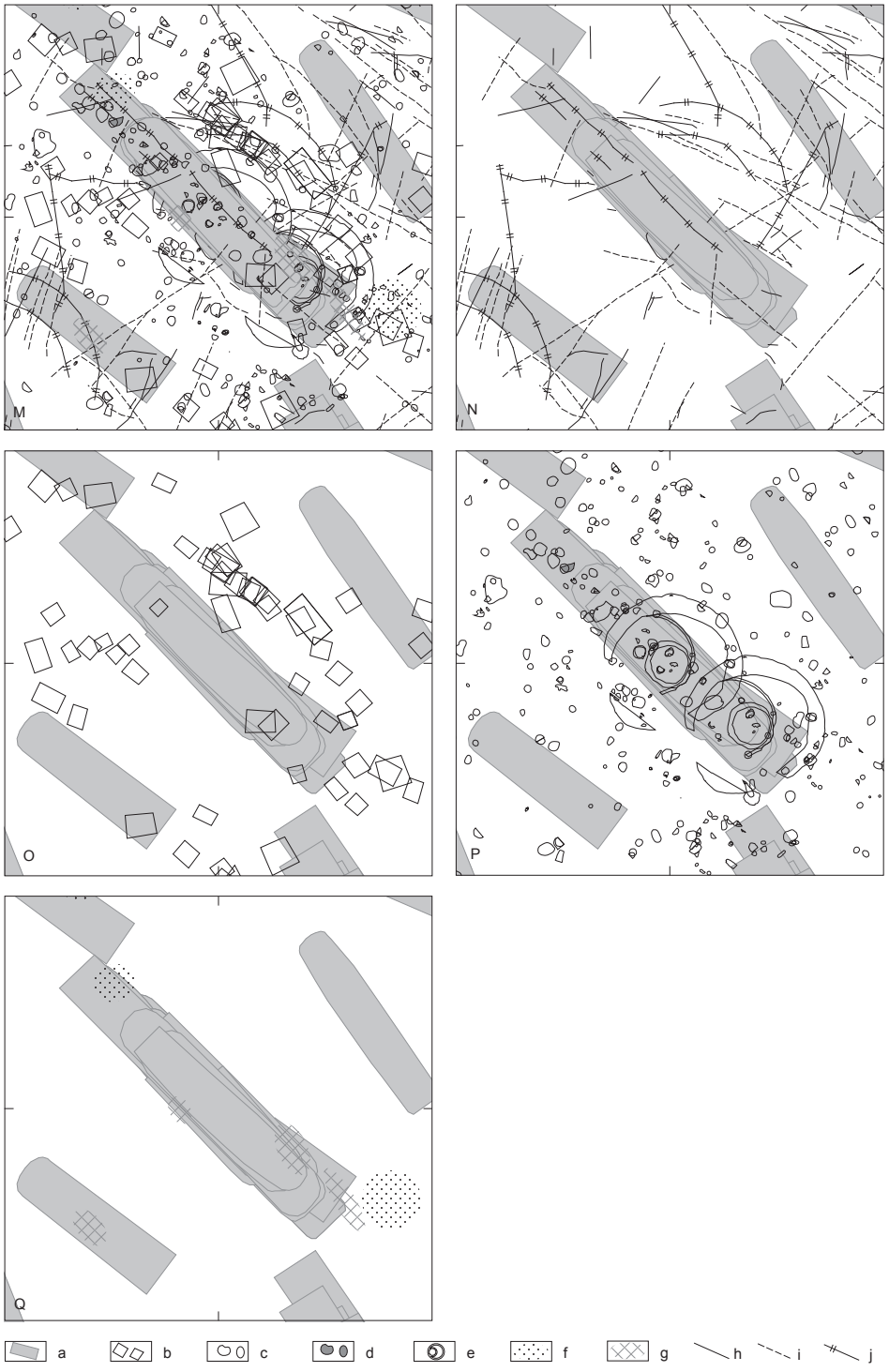

Fig. 6.44 (continued) Rotated VASO plot for De Bogen house-sites 28-4CH (A), 28-1AH (B), 45BH (C), 45HH (D), 45AH (E), 45CH (F), '45DH' (G), 29B2/3H (H), '29AH' (I), 30BH-EH (J), 30GH (K), 30AH (L) and the VASO plot for all elements (M) and the houses, fences and palisades (N), the houses and outbuildings (O), the houses, pits and funerary sites (P) and the houses and hoof-imprints and ard-marks (Q).
a: houses, b: outbuildings, c: pits, d: wells, e: funerary site, f: cattle hoof-imprints, g: ard-marks, h: type-1a fences, i: type-2 fences, j: palisades.

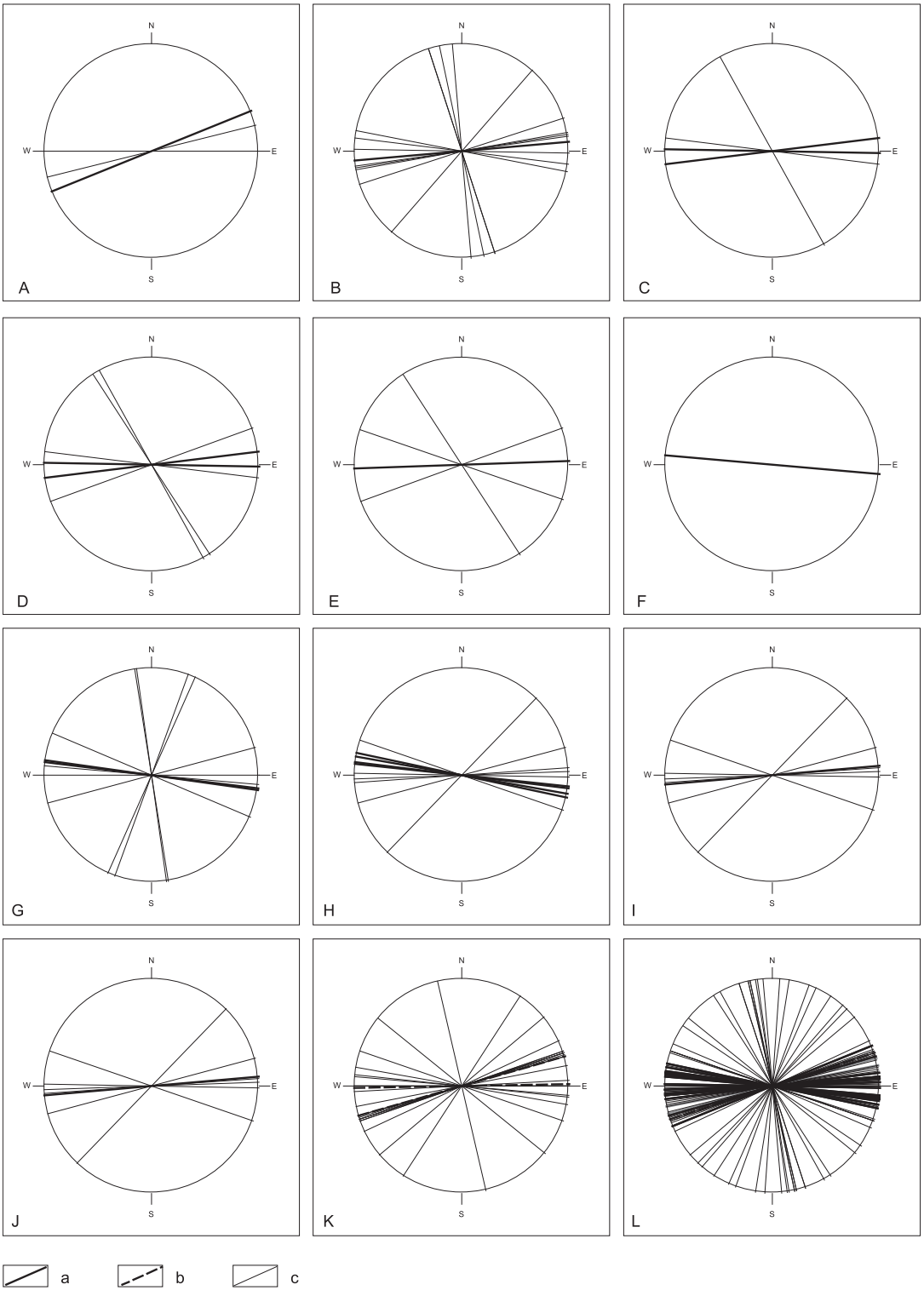

Fig. 6.45 Wind-rose diagrams for De Bogen house-sites 28-4CH (A), 28-1AH (B), 45BH (C), 45HH (D), 45AH (E), 45CH (F), 29B2/3H (G), 30BH-EH (H), 30GH (I), 30AH (J), outbuildings not assigned to house-sites (K) and all combined (L).

a: houses, b: barn/shed-type outbuildings, c: granary-type outbuildings.

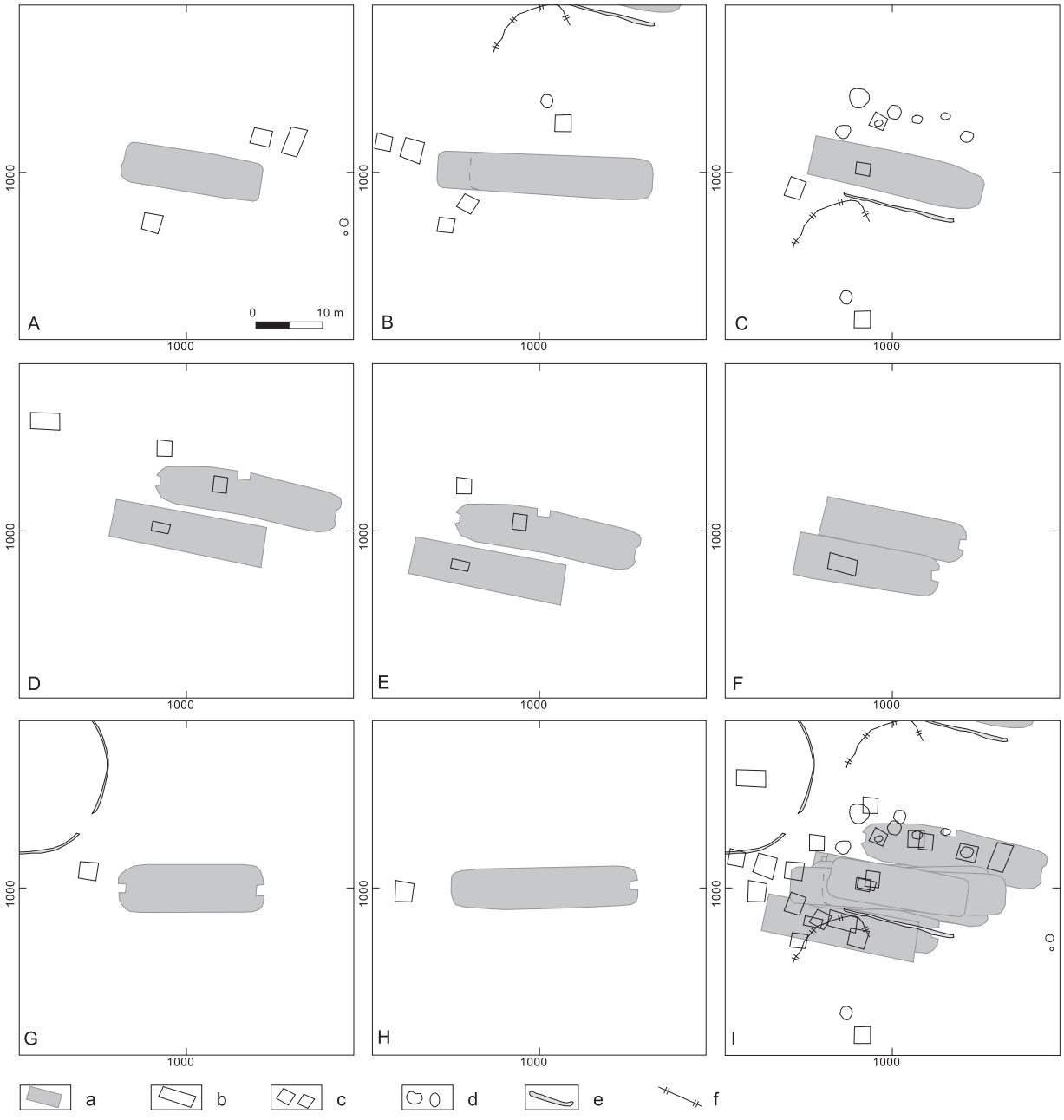

Fig. 6.46 VASO plot towards magnetic north for De Horden house-sites 1 (A), 2ab (B), 3 (C), 4 (D), 5 (E), 7 (F), 9 (G), 10 (H) and the VASO plot for all elements (I).

a: houses, b: barn/shed-type outbuildings, c: granary-type outbuildings, d: pits, e: ditches, f: palisade.

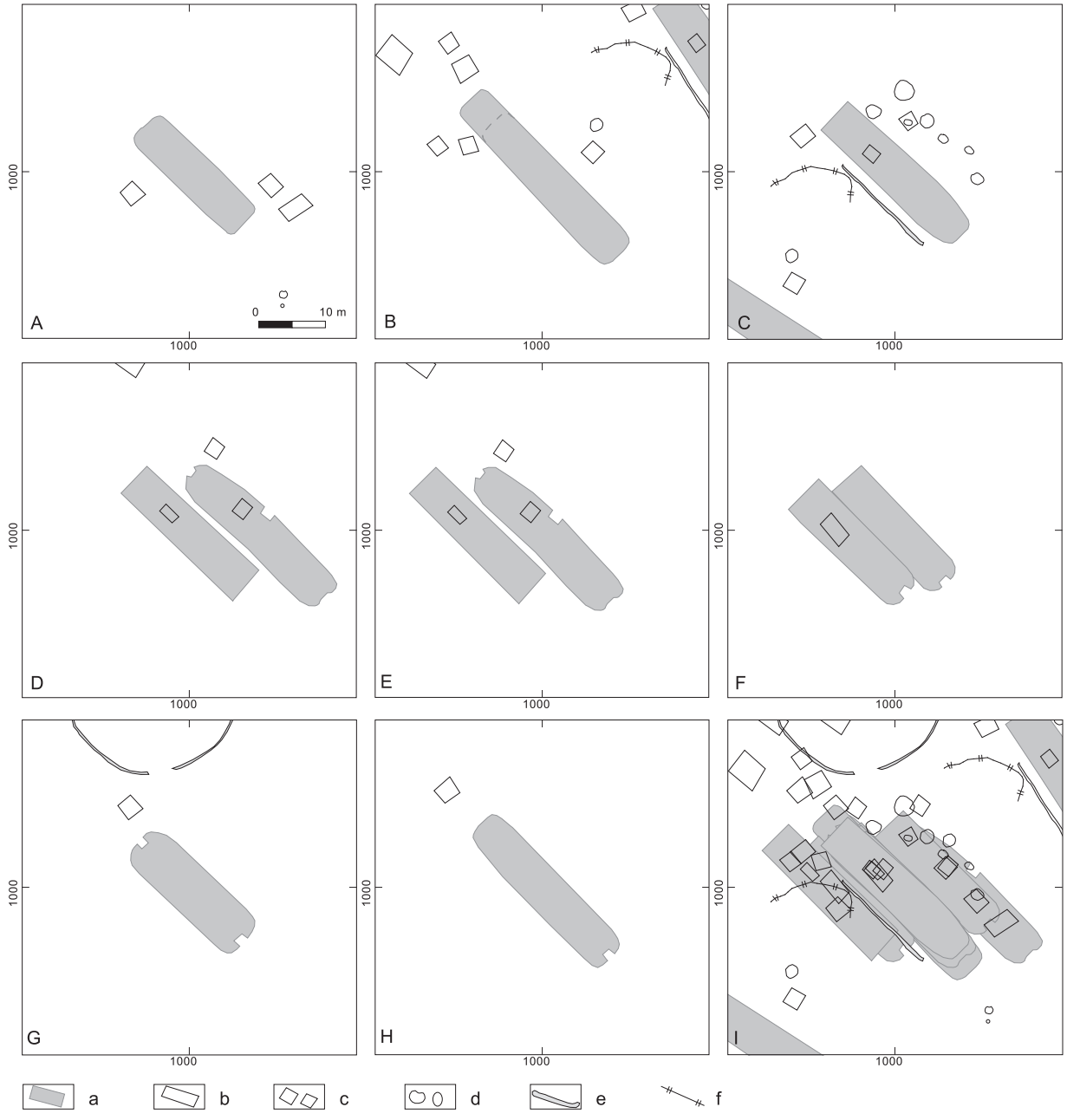

Fig. 6.47 Rotated VASO plot for De Horden house-sites 1 (A), 2ab (B), 3 (C), 4 (D), 5 (E), 7 (F), 9 (G), 10 (H) and the VASO plot for all elements (I).

a: houses, b: barn/shed-type outbuildings, c: granary-type outbuildings, d: pits, e: ditches, f: palisade.

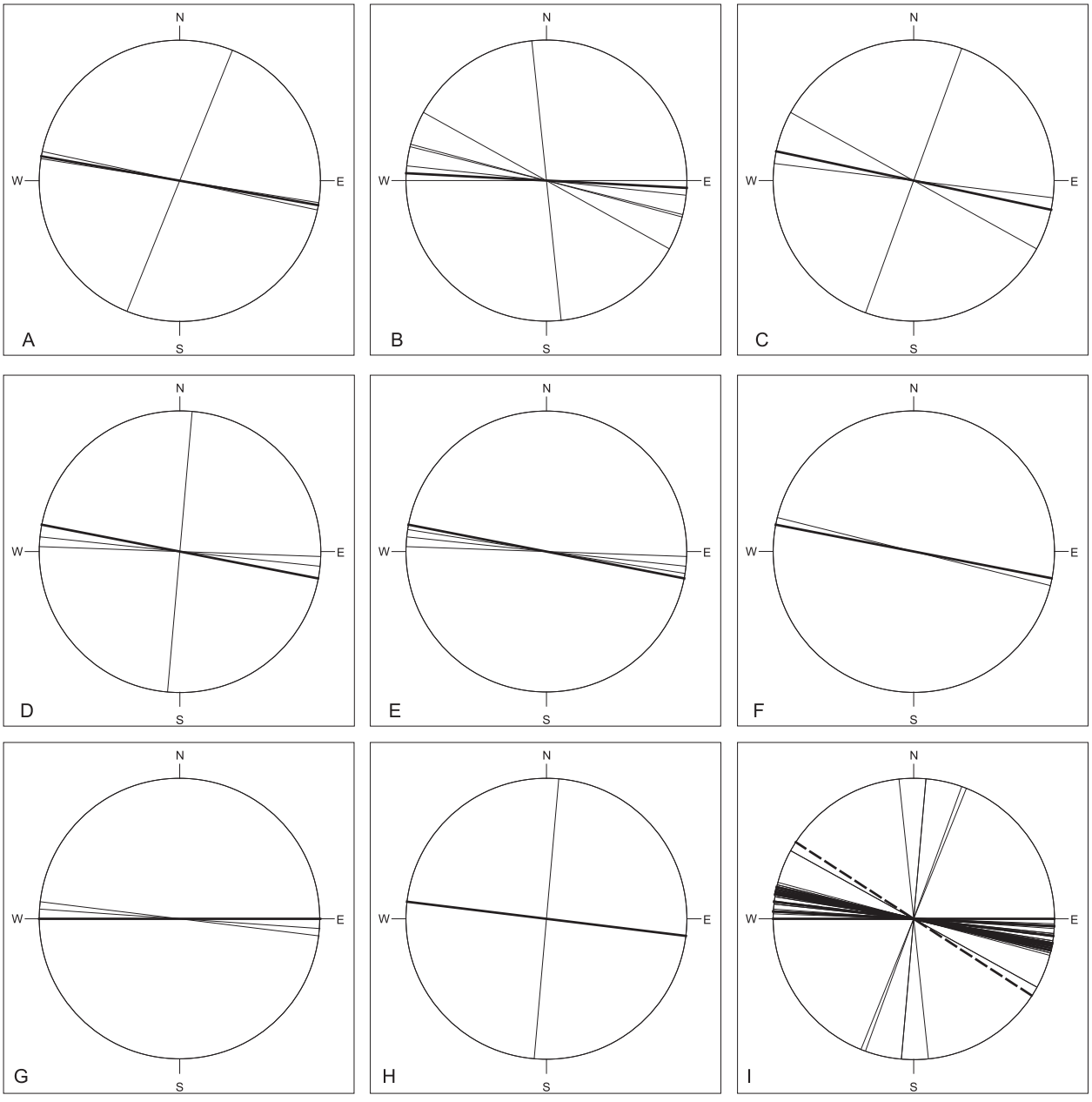

Fig. 6.48 Wind-rose diagrams for De Horden house-sites 1 (A), 2ab (B), 3 (C), 4 (D), 5 (E), 7 (F), 9 (G), 10 (H) and all combined (L).
a: houses, b: barn/shed-type outbuildings, c: granary-type outbuildings.

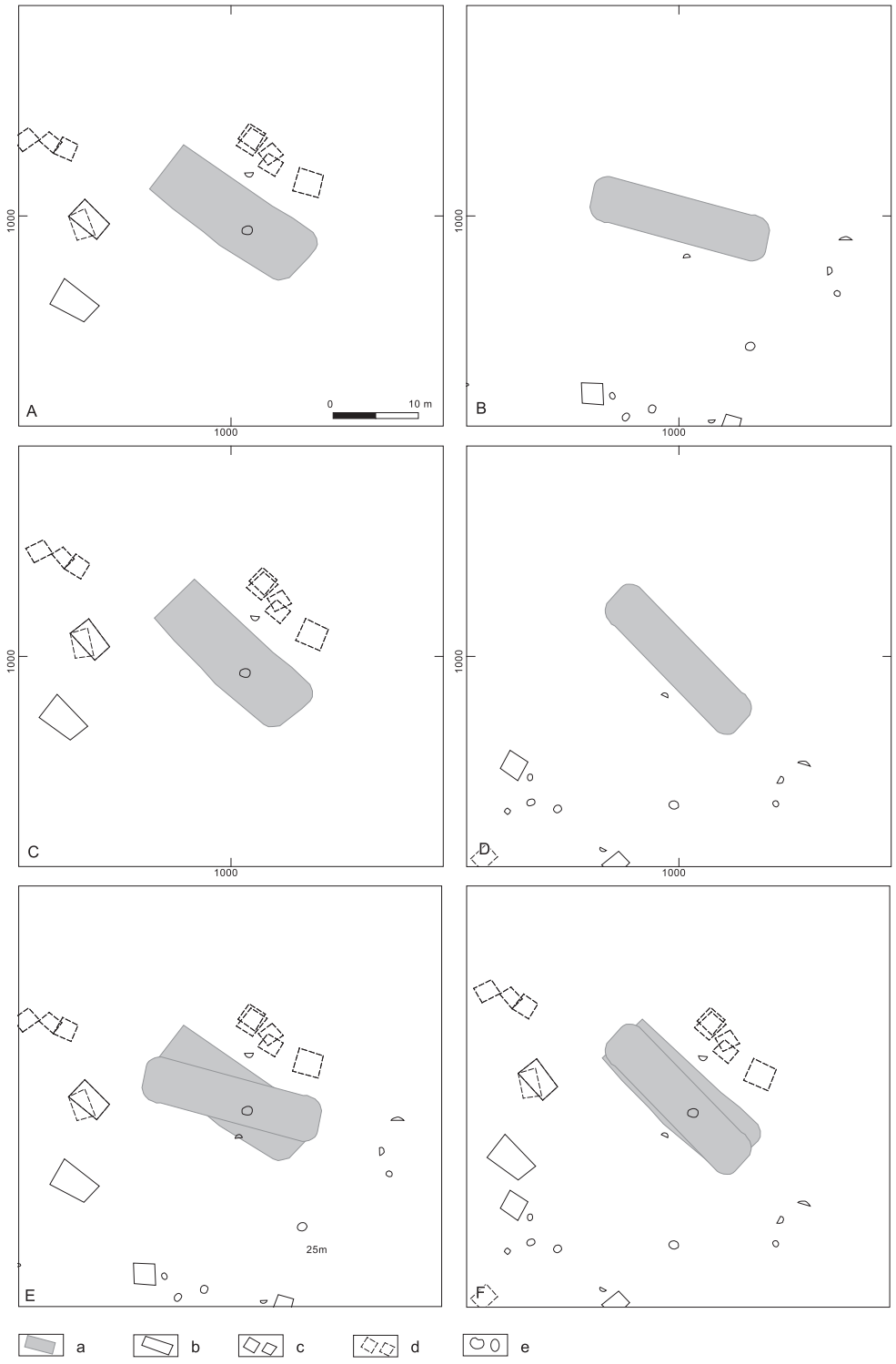

Fig. 6.49 VASO plot towards magnetic north for Lienden house-sites 14D (A), 15P (B), and rotated plots for 14D (C), 15P (D), and overlay plots towards magnetic north (E) and rotated overlay plot (F).

a: houses, b: barn/shed-type outbuildings, c: granary-type outbuildings, d: hypothetical outbuildings, e: pits.

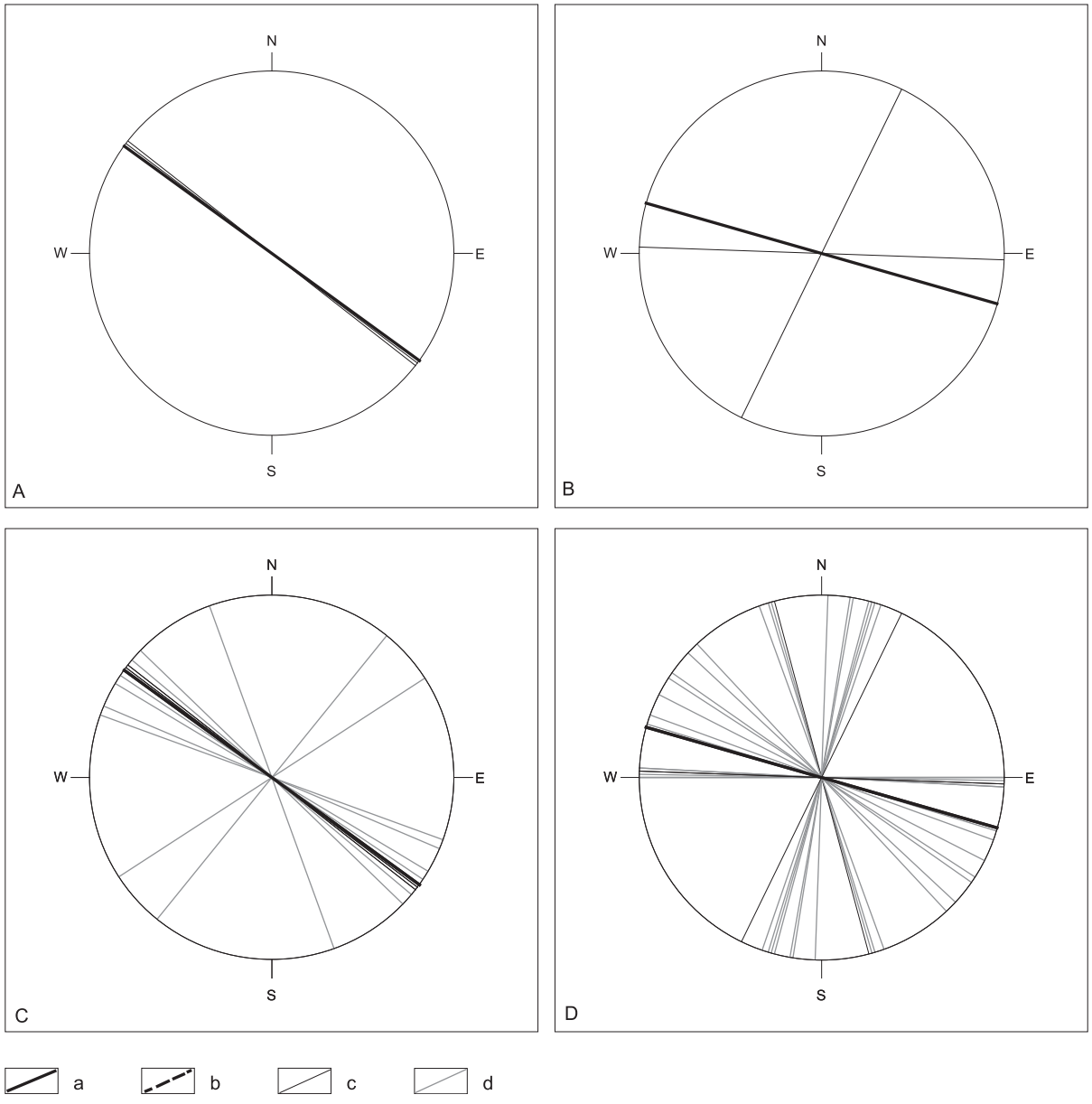

Fig. 6.50 Wind-rose diagrams for Lienden house-sites 14D (A), 15P (B), 14D all (including hypothetical) outbuildings (C) and 15P with all (including hypothetical) outbuildings (D).

a: houses, b: barn/shed-type outbuildings, c: granary-type outbuildings, d: hypothetical outbuildings.

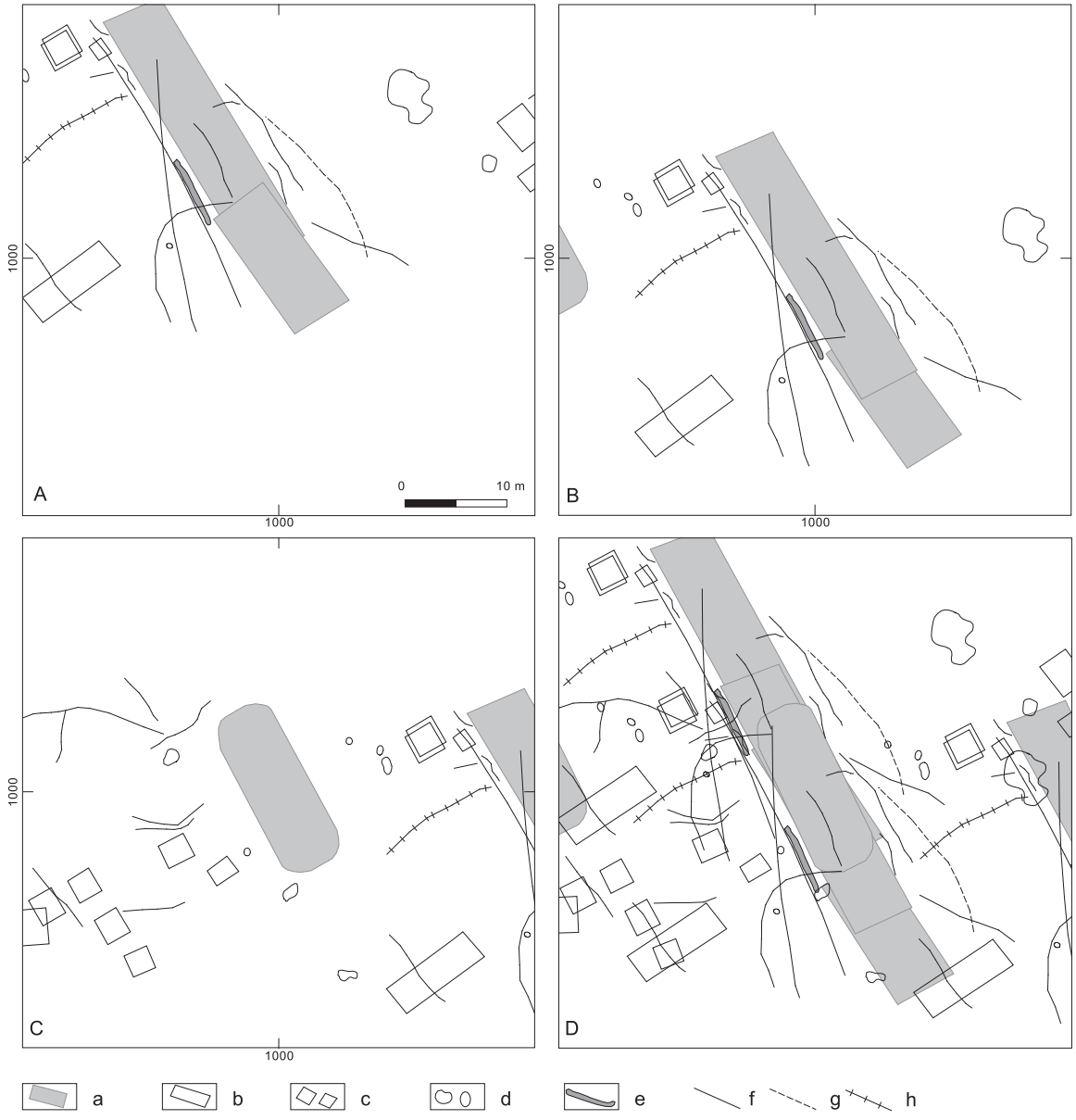

Fig. 6.51 VASO plot towards magnetic north for Dodewaard house-sites 1a (A), 1bc (B), 2 (C) and the VASO plot for all elements (D).
a: houses, b: barn/shed-type of outbuildings, c: granary-type of outbuilding, d: pits, e: ditches, f: type-1a fences, g: type-2 fences, h: type-3 fences.

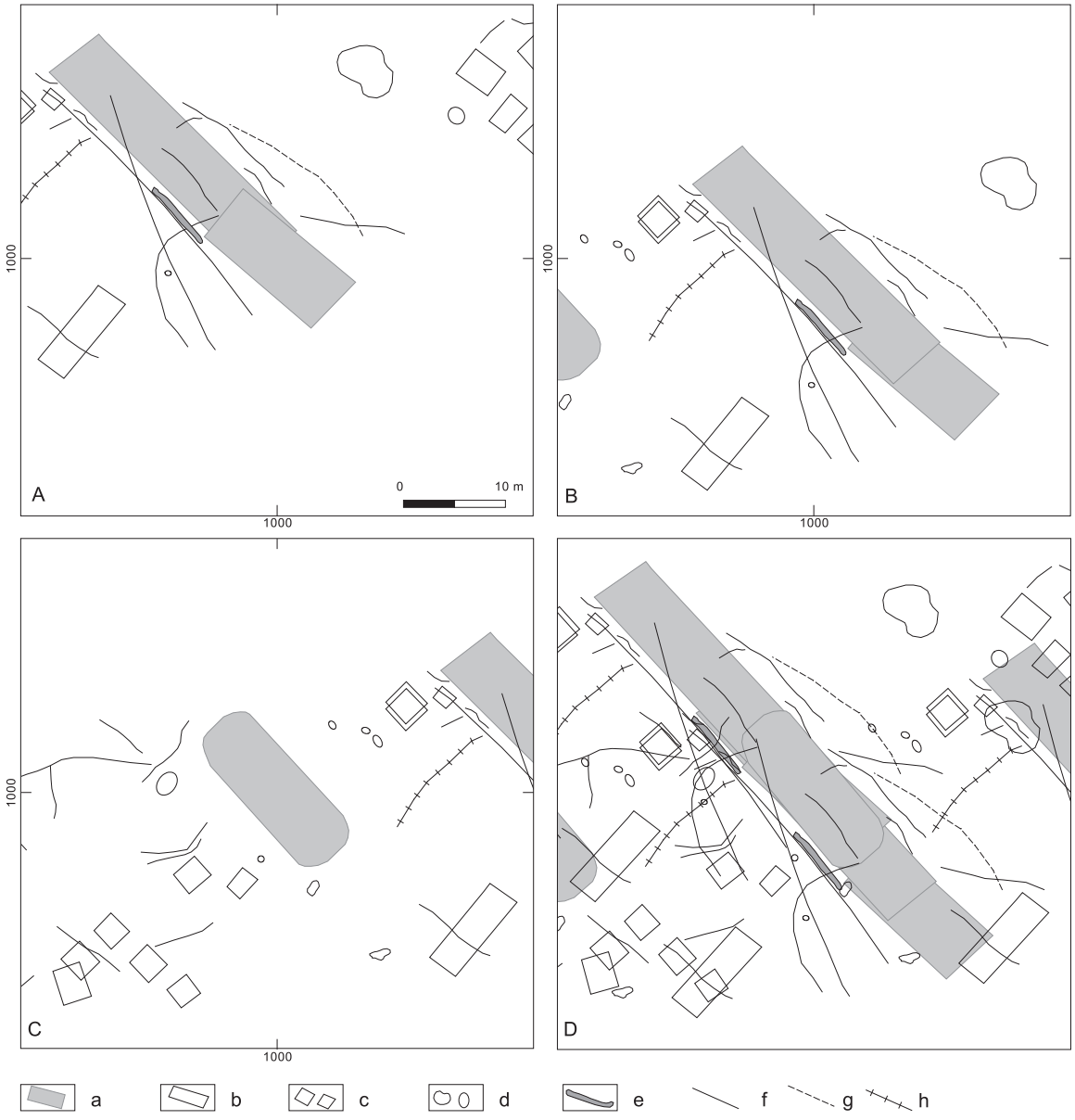

Fig. 6.52 Rotated VASO plot for Dodewaard house-sites 1a (A), 1bc (B), 2 (C) and the VASO plot for all elements (D).

a: houses, b: barn/shed-type of outbuildings, c: granary-type of outbuilding, d: pits, e: ditches, f: type-1a fences, g: type-2 fences, h: type-3 fences.

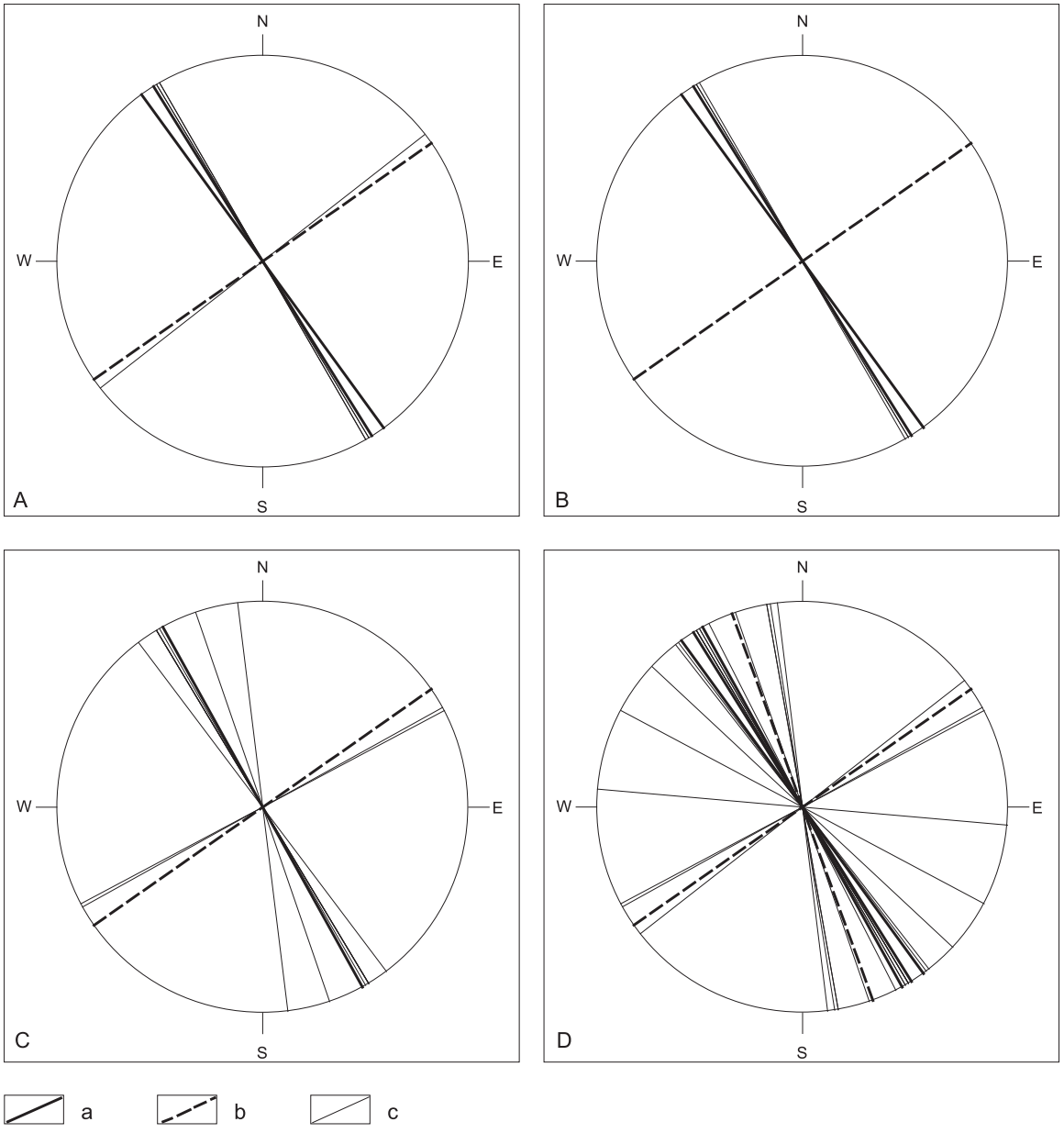

Fig. 6.53 Wind-rose diagrams for Dodewaard house-sites 1a (A), 1bc (B), 2 (C) and all combined (D). a: houses, b: barn/shed-type outbuildings, c: granary-type outbuildings.

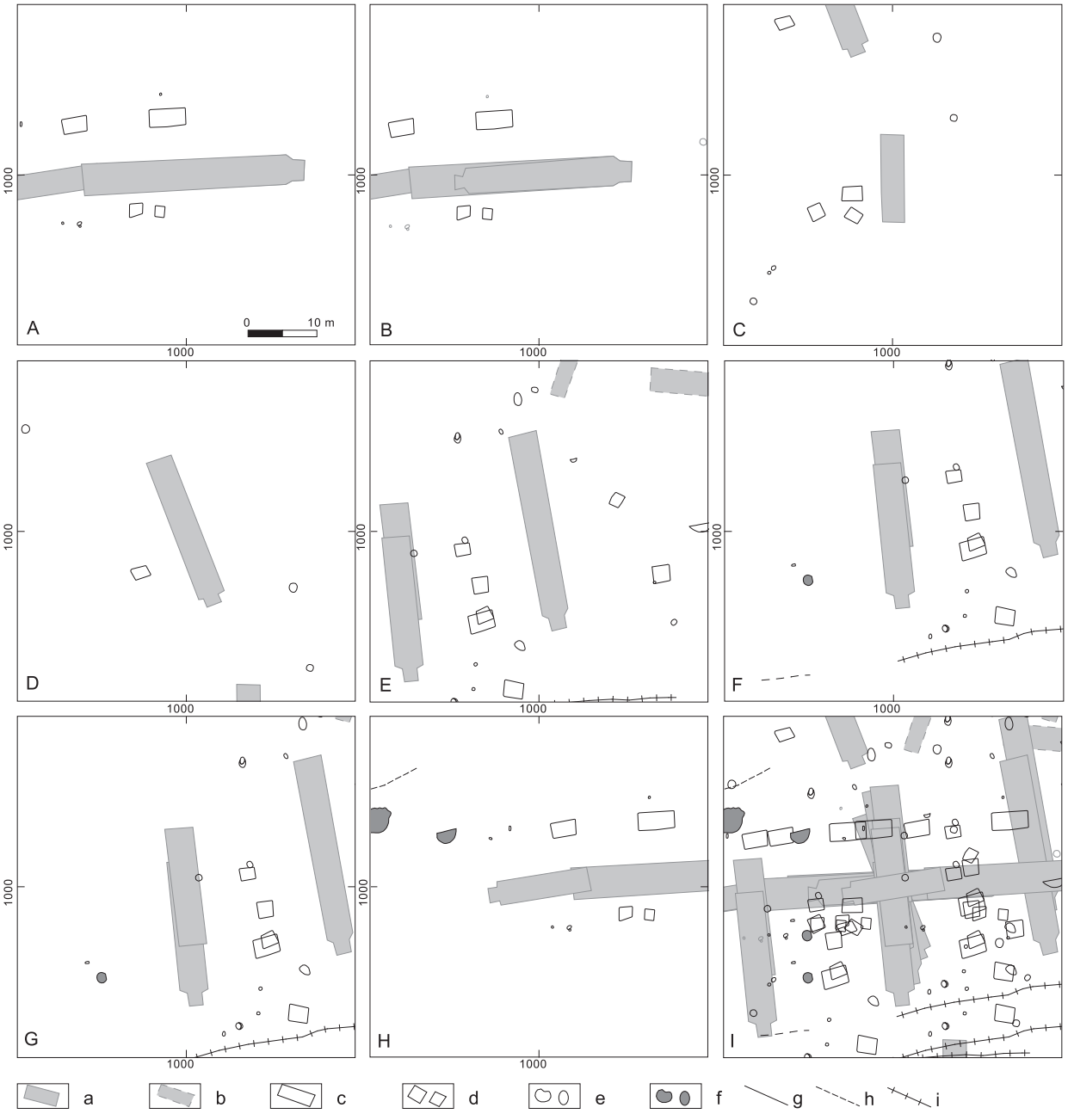

Fig. 6.54 VASO plot towards magnetic north for Tiel - Medel 8 MBA house-sites 1a (A), 1b (B), 2 (C), 3 (D), 5 (E), 6 (F), 7 (G), 8 (H) and the VASO plot for all elements (I).

a: houses, b: late bronze age structure, c: barn/shed-type outbuildings, d: granary-type outbuildings, e: pits, f: wells. g: type-1a fences, h: type-2 fences, i: other types of fences.

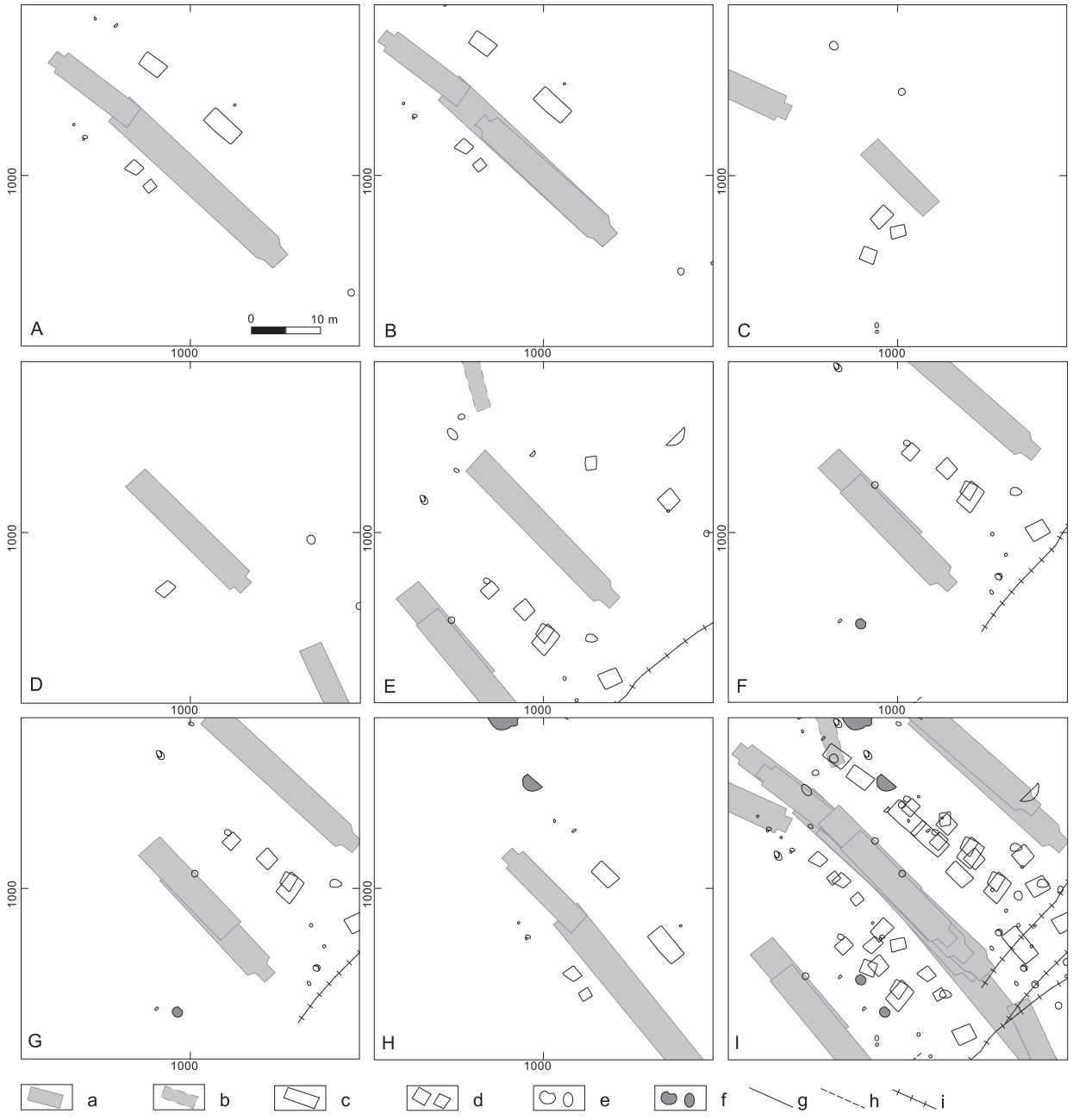

Fig. 6.55 Rotated VASO plot for Tiel - Medel 8 MBA house-sites 1a (A), 1b (B), 2 (C), 3 (D), 5 (E), 6 (F), 7 (G), 8 (H) and the VASO plot for all elements (I).

a: houses, b: late bronze age structure, c: barn/shed-type outbuildings, d: granary-type outbuildings, e: pits, f: wells. g: type-1a fences, h: type-2 fences, i: other types of fences.

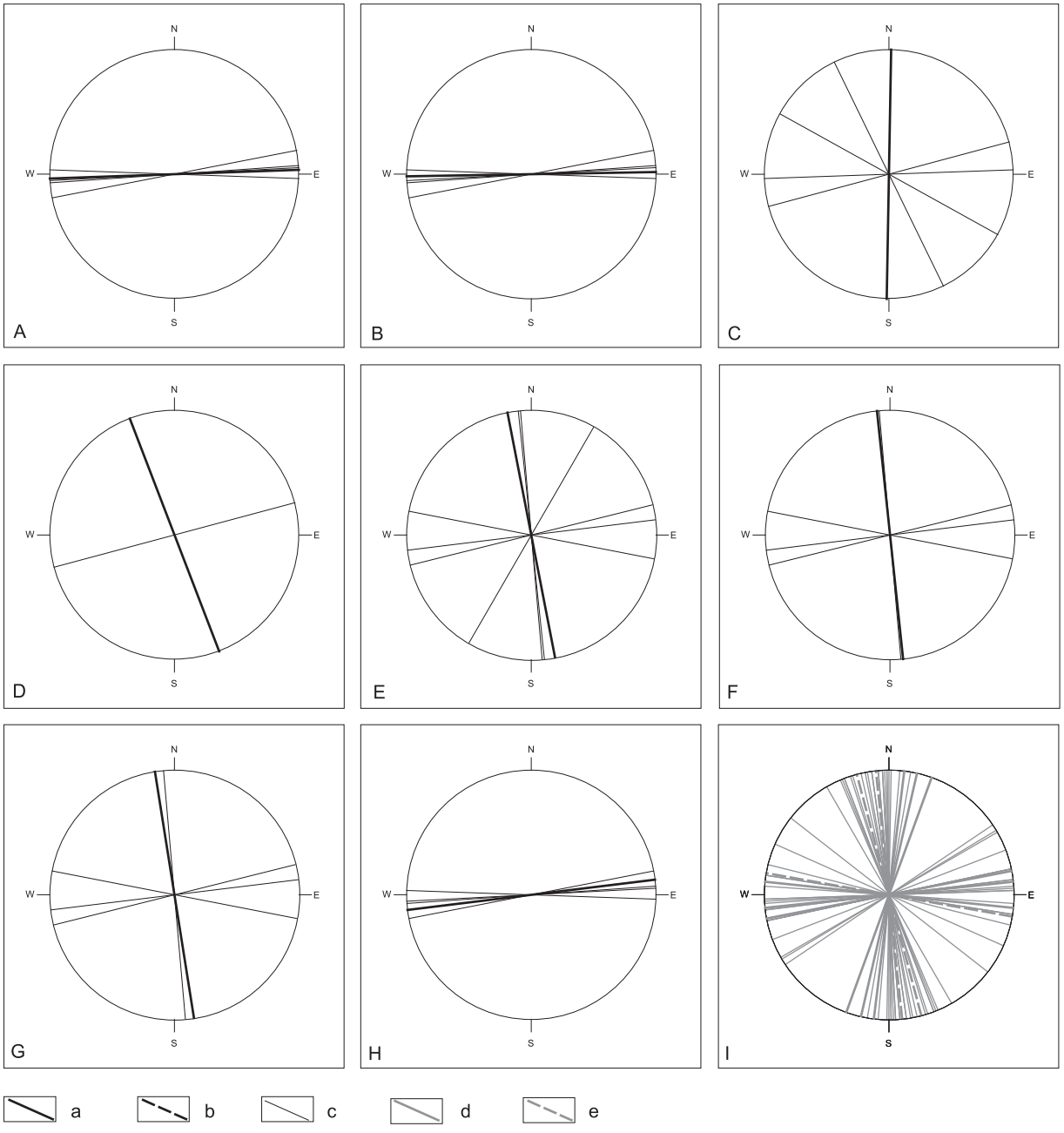

Fig. 6.56 Wind-rose diagrams for Tiel - Medel 8 house-sites 1a (A), 1b (B), 2 (C), 3 (D), 5 (E), 6 (F), 7 (G), 8 (H) and all combined also with LBA or unassigned outbuildings (I).

a: houses, b: barn/shed-type outbuildings, c: granary-type outbuilding, d: LBA or unassigned house, LBA or unassigned barn/shed-type outbuilding, e: LBA or unassigned granary-type outbuilding.

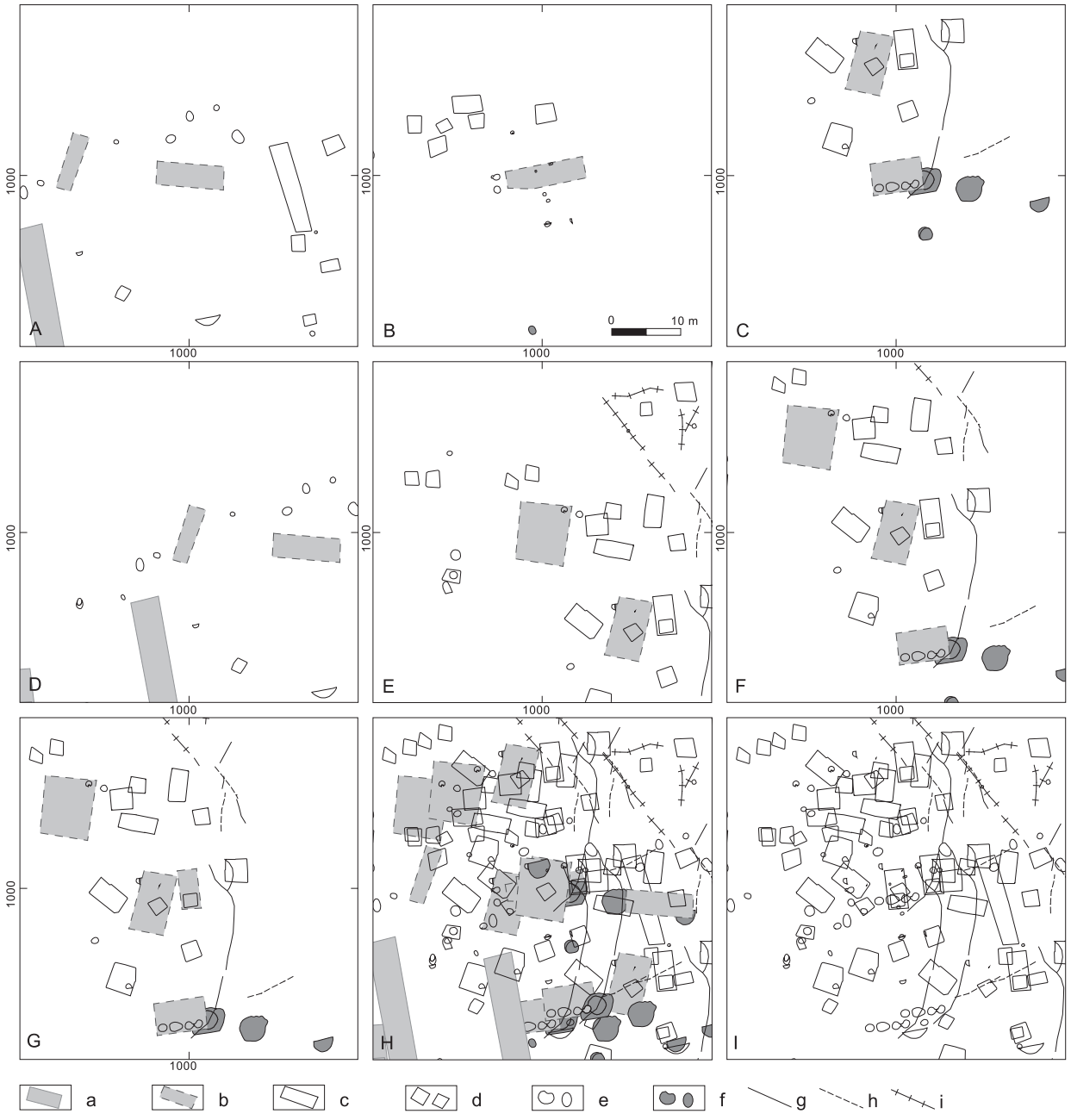

Fig. 6.57 VASO plot towards magnetic north for Tiel - Medel 8 possible Late Bronze Age house-sites 4 (A), 9 (B), 10 (C), 11 (D), 12 (E), 13 (F), 14 (G), the VASO plot for all elements (H) and the VASO plot for all elements minus the houses and wells (I).

a: MBA houses, b: Late Bronze Age possible houses, c: barn/shed-type outbuildings, d: granary-type outbuildings, e: pits, f: wells. g: type-1a fences, h: type-2 fences, i: other types of fences.

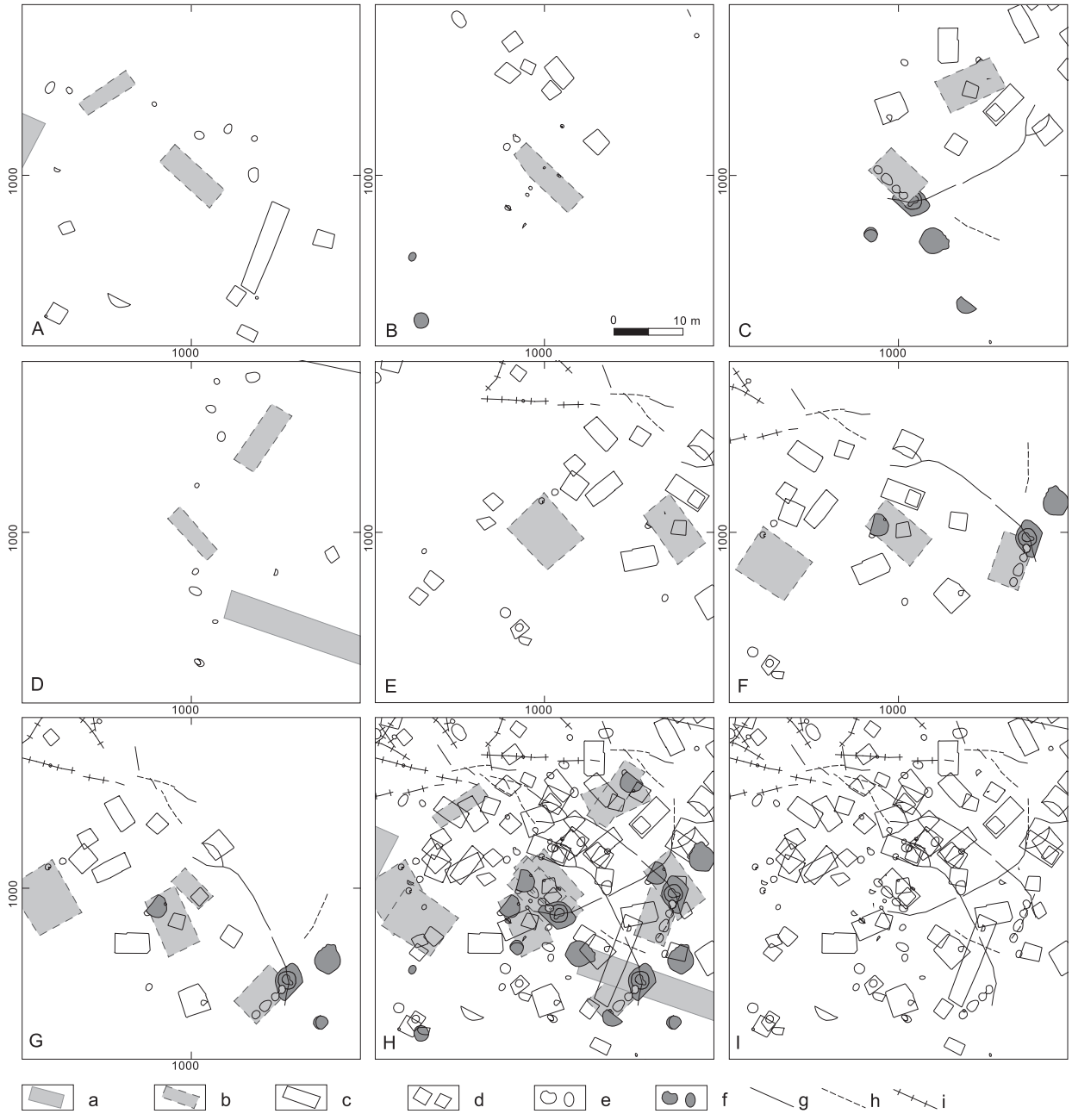

Fig. 6.58 Rotated VASO plot for Tiel - Medel 8 possible Late Bronze Age house-sites 4 (A), 9 (B), 10 (C), 11 (D), 12 (E), 13 (F), 14 (G), the VASO plot for all elements (H) and the VASO plot for all elements minus the houses and wells (I).

a: MBA houses, b: Late Bronze Age possible houses, c: barn/shed-type outbuildings, d: granary-type outbuildings, e: pits, f: wells. g: type-1a fences, h: type-2 fences, i: other types of fences.

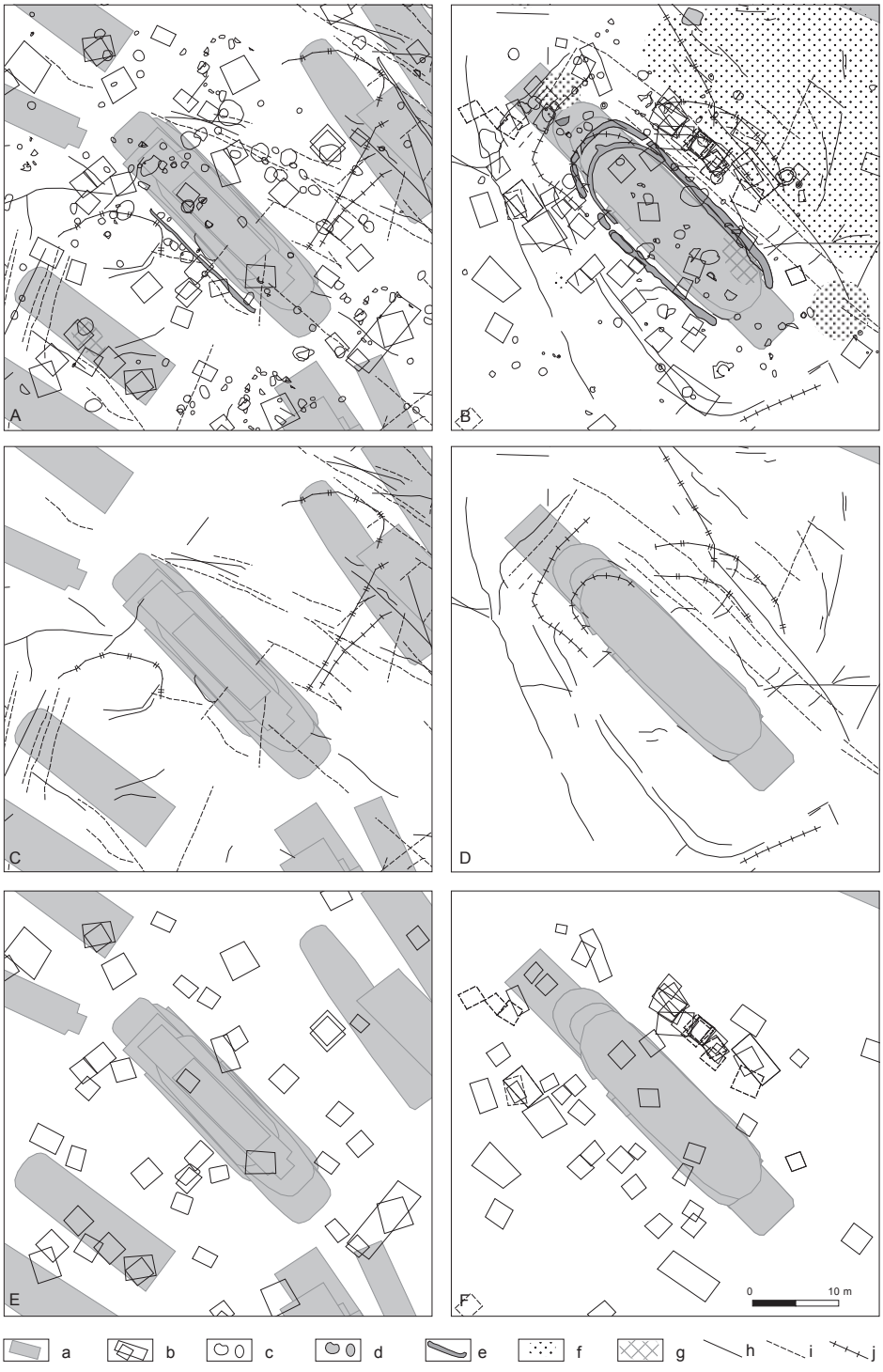

Fig. 6.59 Rotated VASO plot for the ten house-sites with the smallest (A, C, E) and largest (B, D, F) combined first and second inter- house-site distances (according to table 6.1, sum of columns three and four) in order to compare possible isolated versus nucleated house-sites. In A and B all elements are shown, in C and D only the houses and fences and in E and F the houses and outbuildings are shown.

a: houses, b: outbuildings, c: pits, d: wells. e: ditches, f: hoof-imprints, g: ard-marks, h: type-1a fences, i: type-2 fences, j: other types of fences.

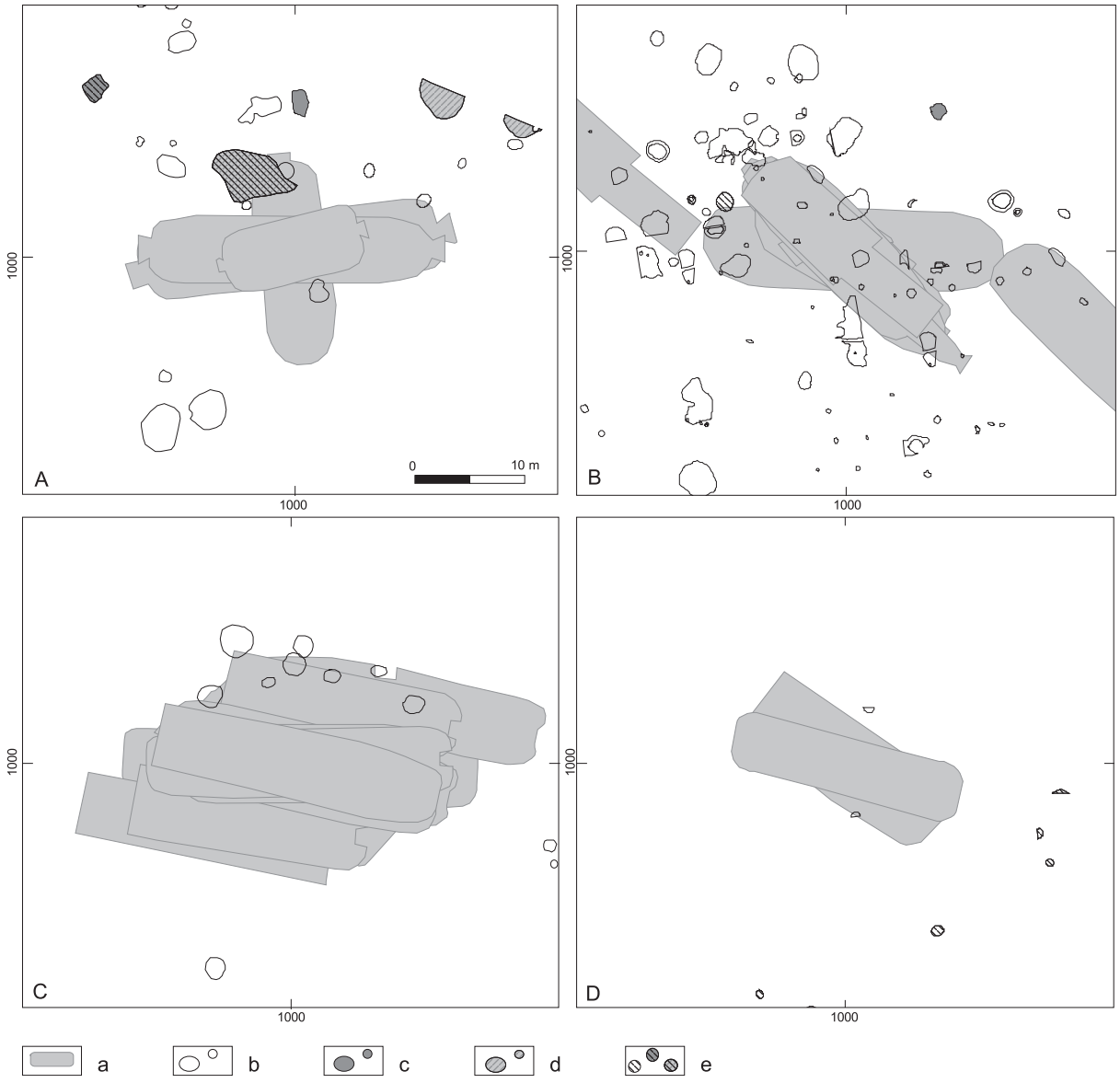

Fig. 6.60 VASO plot towards magnetic north for houses and pits at Zijderveld (A), Eigenblok (B), Wijk bij Duurstede - De Horden (C) and Lienden (D).

a: houses, b: pits, c: wells, d: drinking pools, e: possibly used (secondarily) as refuse pit.