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## European ancient settlements – A guide to their composition and morphology based on soil micromorphology and associated geoarchaeological techniques; introducing the contrasting sites of Chalcolithic Bordușani-Popină, Borcea River, Romania and Viking Age Heimdaljordet, Vestfold, Norway

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## ABSTRACT

Specific soil micromorphological, broader geoarchaeological and environmental archaeology signatures of settlement activities and land use have been identified from numerous case studies across Europe – from Romania to western Norway. In order to demonstrate how such investigations contribute to our understanding of settlement morphology and its wider landscape, an improved way of organising site-specific information or guide was created (Macphail and Goldberg, in press). Activities and land use are divided into 'Within Settlement', 'Peripheral to Settlement' and 'The Settlement's Wider Landscape'. Major themes identified are: Constructions (and materials), Trackways and paths (and other communication/transport-associated features), Animal Management, Water Management, Waste Disposal (1: middening; 2: human waste), Specialist Domestic and Industrial Activities and Funerary Practices. In the case of trackway deposits, their characterisation aids the identification of intensely occupied areas compared to rural communications, although changing land use within urban areas has also produced 'rural signatures' (e.g. as associated with animal management), for example in Late Roman cities. Specialist activities such as fish and crop processing or working with lead and other metals, in-field and within-wall manuring, stabling and domestic occupation floor-use evidence, and identification of different funerary practice – cremations, boat graves and other inhumations, and exarnation features – and peripheral constructions such as boat-houses, are also noted. New information from the Chalcolithic tell site of Bordușani-Popină, Romania and seasonally occupied Viking settlement of Heimdaljordet, Norway, is introduced.

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## 1. Introduction

Attempts to study the integrated relationship between an urban settlement and its hinterland in complex societies has been a focus of interest for decades, for example in the cases of nearby constructional material quarrying in Paris, France and the discovery

of 'rural' signatures within 'urban' space in English cities (Ciezar et al., 1994; Macphail, 1994). Although use of space investigations within the built environment were also given special attention (Cammis, 1994; Matthews and Postgate, 1994), agriculture (cultivation and animal husbandry) was more likely to be studied in isolation (Macphail et al., 1987; Courty et al., 1991; Gebhardt, 1992). It is therefore timely to suggest improved ways or a guide that could aid our understanding of activities and use of space within a settlement, and how the nearby and more distant managed landscape

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functions as a whole (Table 1; Macphail and Goldberg, in press). This suggested model or guide was presented for discussion in 2015 at the Conference on the Environmental Archaeology of European Cities (Brussels, 27–29 May). This paper attempts to summarise the guide and some of the background to it.

The divisions in Table 1 are not simply for convenience, but also reflect the likelihood that constructions will be mainly within the settlement, grain dryers and animal stock yards peripheral to the settlement, while pastures, fields and woodlands are most often to be found in areas between settlements. This requires that unusually, road systems, water management and funerary practice, for example, are also characterised alongside use of space within structures and areas given up to artisan/industrial and middening practices. It can also be noted that according to culture, the location of funerary activities will vary – some near the settlement whereas others may be more distant (see 3.7).

When deposits are well-preserved, such investigations are relatively straight forward, but when post-depositional processes have been active, whether these are natural or anthropogenic in nature, such characterisations of original deposits and use of space can be challenging (Courty et al., 1989). In order that major episodes in the life of cities are not ignored there has been therefore a long

campaign to study the resulting enigmatic deposits, or ‘dark earth’. In fact, dark earth simply represents the result of different or atypical uses of urban space (Galinié, 2004). Much reconstruction of land use has been carried out using dark earth as a resource (e.g. Nicosia et al., 2012; Devos et al., 2013; Macphail, 2014; Borderie et al., 2014a). Outside Europe, this has also been the aim of some Amazonian Dark Earth (*-terra preta*) investigations, especially when applied to recognisable settlements (Arroyo-Kalin et al., 2008; 2014; Graham et al., 2015).

As detailed in Table 1, elements that make up a settlement are composed of: constructions; trackways, roads and paths; animal management; water management; waste disposal I (middening); waste disposal II (latrines and cess pits); specialist domestic and industrial activity; funerary practices (cf. Macphail and Goldberg, 2010). Other investigators have produced different templates that are site, or site-type specific (Schiffer, 1987; Gé et al., 1993; Cammas et al., 1996; Matthews, 2005). The suggested guide (please see details in Table 1) is very broadly adapted from theories in human geography by Johann Heinrich von Thünen (1783–1850), basic archaeological schemes of ‘infield’ and ‘outfield’, and archaeological theory. The last, as applied to archaeological soil studies by workers such as John CC Romans and others since the 1980s; more recently

**Table 1**  
A suggested guide to settlement composition including soil micromorphological examples (see Figs).

The settlement		
Within the settlement	Peripheral to the settlement	The settlement's wider landscape
<b>Constructions</b> Remains and residues of occupation surfaces (Fig. 5) and use of manufactured lime floors, mortar, daub, adobe/mudbrick etc. (Fig. 14); storage pits, wells (also below), ‘pit house’ (e.g. Grubenhäuser; Fig. 6), and post hole, and ditch fills that demarcate long houses (roof ditches) and settlement plots (see heimdaljordet for ‘parcel’ ditches; Fig. 4a–b, 18 and 21); hearth deposits, urban gardens; roof remains (roof collapse and razed buildings).	Ramparts and walls (earth and turf constructions); moats, ditches, millponds, paddy fields (potential fish source), grain dryers, baking ovens and cooking pits; landscaped gardens; fairs and markets.	Monuments – tumuli, grave mounds (Fig. 4a) and other features – Cursuses (see below); road systems (Figs. 7–9), animal enclosures (see below); arable fields, and associated constructions – ridge and furrow; soft and hard rock quarries, field and forest boundaries.
<b>Trackways, roads and paths</b> ‘Rural’ signatures – dung traces, minor P concentrations. ‘Urban’ signatures – food, food preparation and domestic waste, with hearth and industrial residues, and concentrated faecal materials (Fig. 10).	Chiefly ‘rural’ in character, in and out of settlement, linking local waterholes, ‘infields’, stockyards and pastures (‘cattle paths’ of Norway); some spillage of organic and settlement waste manures; stock and vehicle movements. Slipways, waterfront and harbours – shallow water sediments sometimes rich in refuse.	Chiefly ‘rural’ in character, linking major settlements (Bronze and Iron Age precursors of British Roman road system in places); accessing wider landscape – woodland resources and arable fields, with animal passage along droveways (e.g. transhumance) and pastures (Figs. 7–9).
<b>Other transport (harbours and waterfronts)</b> <b>Animal management</b> Stabling activity and byres (Figs. 11, 12, 16–17), including tri-partite longhouses; specialised features from pig and bird husbandry (e.g. doves/cotes).	Enclosures and corrals, and associated shallow waterholes.	Pasture soils and effects of stock concentrations (grazing, browsing and woodland pig husbandry); rock shelter stabling; accessing ponds and wetland.
<b>Water management</b> Sediments of well use and disuse; other features – moats and ditches (Fig. 18); lead pipes (Pb traces).	Aqueducts, canals, ponds/fish ponds, reservoirs and millponds; irrigated fields and drainage ditches.	(For examples of hunting and gathering around natural water sources – see Borđuşani-Popină tell)
<b>Waste disposal 1; middening</b> Street-side and street dumping; middening, pit and other feature fills and ‘farm mound’ creation; expedient refuse disposal within structures (Figs. 11, 15 and 21)	Major manuring with dung and settlement waste of ‘infield’ horticulture, with spillage along trackways (Fig. 9).	
<b>Waste disposal 2: latrines and cess pits</b> Occurrence of concentrated human waste in cess pits and outflows (~sewers) (Figs. 19 and 20).	Human waste as manure.	
<b>Specialist domestic and industrial activity</b> High temperature burned sediments and fuel waste, ferrous and non-ferrous metal working, with leather and wood crafts, and use of lead (e.g. alloys and construction); storage and pitfills, food processing (cereal, fish and meat ‘butchery’, smoking, blubber boiling) and salt working (Figs. 13, 15, 21 and 22).	Furnaces, lime kilns, grain dryers, and salt working; industrial waste in minerogenic manures and as recycled for constructions (temper in lime plasters and mortars, and daub – ‘clay walls’).	Fuel and raw material gathering and management of resources (woodland coppicing; iron, limestone, flint, clay for ceramics and floor constructions; intertidal plants and sediments for low temperature fuels/salt-processing)
<b>Funerary practices</b> Burials not normally found within Roman settlements, but Late Roman graves do occur; graveyards in ecclesiastical space; excarnation features in Iron Age settlements. Tomb re-use	Graves, cremations and excarnation features; grave mounds juxtaposed to settlements, including boat graves and ship burials.	Tumuli, grave mounds, ship burials and excarnations (Fig. 4).

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