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Mesolithic Coastal Community Perception of Environmental Change in the Southern North Sea Basin

by

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ABSTRACT

SCHOOL OF HUMANITIES
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MESOLITHIC COASTAL COMMUNITY PERCEPTION OF ENVIRONMENTAL CHANGE IN THE SOUTHERN NORTH SEA BASIN

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This thesis applies a multi-scalar, multi-disciplinary approach to evaluate the ways in which we have constructed the Mesolithic for the purposes of archaeological research. The human-environment relationship in the southern North Sea basin is used as the lens through which this period is reexamined and redefined. Exploring the nature of this complex interaction on the macro, meso and micro-scale provides greater insight into what it meant to dwell within this landscape during the Mesolithic period.

In discussing scales of approach, the means by which research is divided over space and time become a decisive element. The use of political borders to orientate prehistoric archaeology is critically examined and a diffuse structure based on environmental parameters key to the Mesolithic experience of the southern North Sea landscape is offered as a better alternative. Due to the time-transgressive nature of Mesolithic chronology in the North Sea basin, temporal divisions framing the research period, nominally 11,700BP to 7,000BP, are equally permeable; the larger chronological context from the end of the Last Glacial Maximum to the early Neolithic is incorporated into interpretations.

To build a multi-scalar interpretation, data from the southern North Sea Mesolithic is analysed at the macro, meso and micro scales. At the micro-scale, a case study in the Waveney valley is used to ground the ideas set forth in this thesis in the complex reality of combining archaeological and palaeoenvironmental data to form interpretations. A database of 2000 boreholes is used to form an understanding of the Mesolithic environment at key stages in the development of this landscape. This is compared with the archaeological record for the region and the possible human perceptions of environmental change during the Mesolithic period are discussed.

At each scale, the persistent importance of dynamic change across each axis of evidence considered; environmental, cultural and conceptual; is apparent. This idea of dynamism is, therefore, suggested as the best categorisation of what the Mesolithic experience the southern North Sea landscape; one which provides a more sympathetic and useful conceptualization of the Mesolithic period. It is, therefore, argued that the application of a multi-scalar, multi-disciplinary approach, reflecting this new definition, is substantiated as the most constructive means of carrying out future interpretation.

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Academic Thesis: Declaration Of Authorship

I, Elizabeth Andrews Dewing, declare that this thesis entitled “Mesolithic Coastal Community Perception of Environmental Change in the Southern North Sea Basin” and the work presented in it are my own and have been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;

2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;

3. Where I have consulted the published work of others, this is always clearly attributed;

4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;

5. I have acknowledged all main sources of help;

6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;

7. Either none of this work has been published before submission, or parts of this work have been published as: [please list references below]:

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With any PhD, a thesis is shaped by the careful guidance of its advisors. In my case, especially, I have benefitted from the unique synergy between Justin and Fraser as they work to meaningfully integrate information from different academic backgrounds. I'd like to thank them for their support, patience and critique. It's been my privilege to work with two people I believe to be truly at the forefront of their fields. I feel extremely lucky to have studied with each of the professors at the Centre for Maritime Archaeology and particularly to have completed my doctorate with this team.

I'm grateful to both of my examiners for their time and consideration in reading this paper and look forward to discussing it with them. Specifically, thank you to William Davies for the insight he provided during my upgrade examination which opened up new avenues for thinking about the Mesolithic and about the implications of mobility during this period. Thank you to Ben Gearey for pointing me towards the Waveney Valley and the possibilities at Beccles, and for his encouragement during conferences.

Not many parents have the willingness or the fortitude required to read through fledgling drafts of a PhD dissertation. Thank you, to mine, for their care in doing so and for discussing the ideas in it with me at such length. It's impossible to imagine the contours of my life without their love, generosity and support; for this, I am deeply thankful.

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For whoever we lose (like a you or a me)
it's always ourselves we find in the sea.
ee Cummings (1926)

Chapter One: Introduction

The Mesolithic period in North West Europe has been envisioned in many different ways since its earliest definitions in archaeological practice. This thesis re-evaluates these conceptualisations and the means by which we have created them through applying a multi-scalar, multi-disciplinary approach. Specifically, the nature of the human-environment relationship during this period is questioned as a means of redefining what it meant to be uniquely Mesolithic in the dynamic coastal landscape of the southern North Sea basin. Individual and community perception of shifting environmental textures form the basis by which we will reassess how we understand the Mesolithic and, therefore, how we frame our archaeological research into this time period.

Defining a spatial border for the southern North Sea basin in the Mesolithic is not easily achieved. This was a rapidly changing landscape altered dramatically by a net rise in sea-level leading to the formation of the North Sea and the separation of the British island from the Continent (Chapter Three). Equally, to divide space by applying modern political borders creates an intellectual divide with the interpreted experience of the Mesolithic landscape, the people in which would not have recognised such demarcations. Mesolithic communities were not organised into Denmark, France or England (Chapters Three and Four). While such spatial divisions are still heavily relied upon in prehistoric archaeological literature today (Chapter Four), this thesis argues for organising study areas around parameters more sympathetic to our datasets and goals of research. Therefore, the shape and extent of this study will be achieved through the application of borders suggested by the macro-environmental patterns derived for this period: ice-cover at the end of the Younger Dryas, the last significant glaciation prior to the Mesolithic; coastline deformation during the Mesolithic period; and coastal sediment typologies (Chapter Three). Regions within this macro-study area will be formed from relative regions of isostatic response to post Last Glacial Maximum (LGM) retreat of the Fennoscandian ice-sheet (Figure 1). As people dwelling in the Mesolithic landscape would have been aware of the results of these changes (as argued throughout this thesis) but not limited by them in their mobility patterns, the spatial boundaries delineated in this dissertation are not rigid cut-off points, but are a diffuse means of creating focus and definition to this study. The research areas applied will be considered within the context of their surrounding continuums.

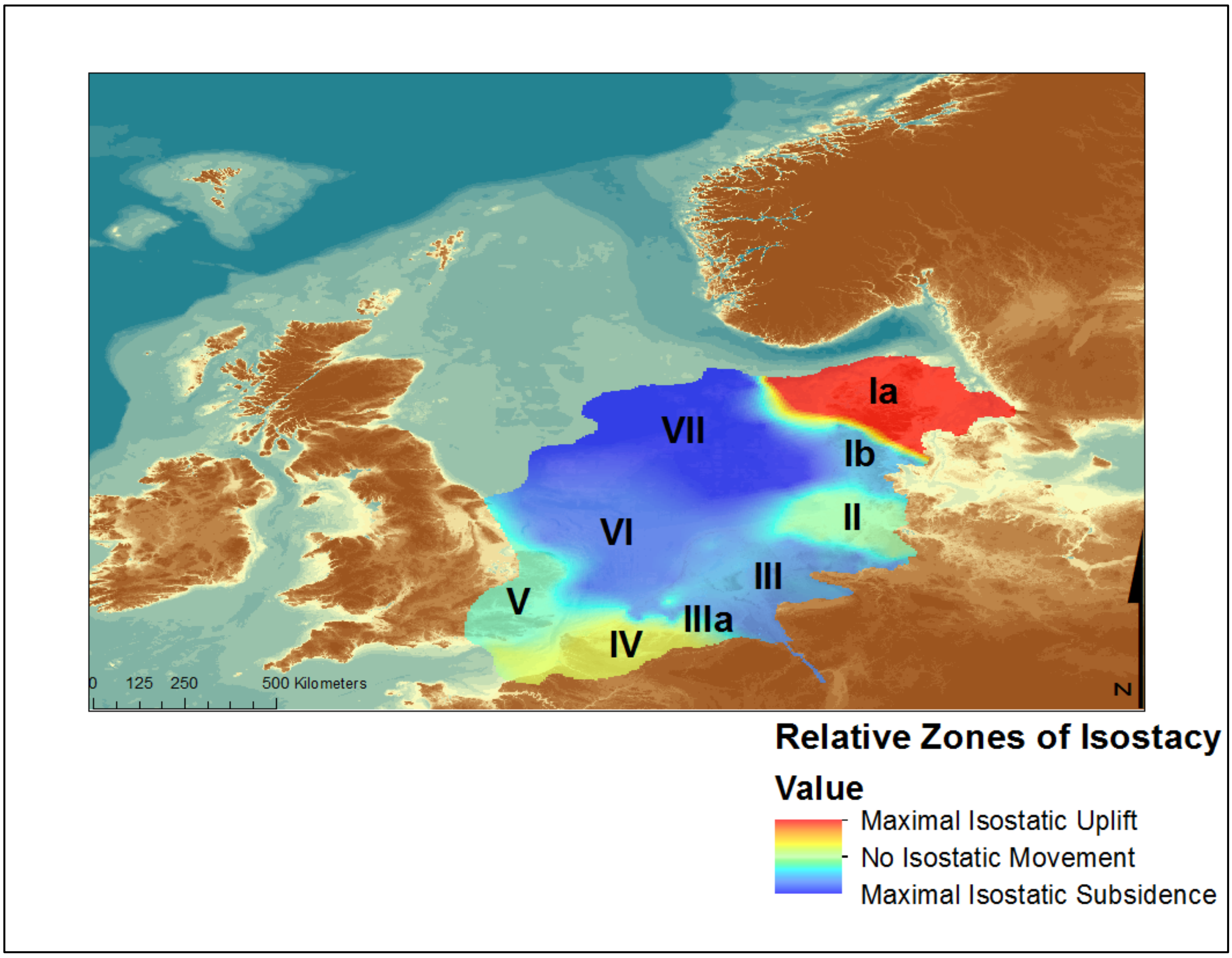

Figure 1. *Study area with relative zones of isostacy.*

Similarly, the temporal range used in this dissertation is a necessarily diffuse extent within a larger chronological spectrum. Across the southern North Sea basin, Mesolithic technologies were adopted and abandoned at markedly different times (Chapter Four); this period did not begin and end concurrently throughout the spatial focus of the study (Figure 2). Also, the distinction of the material record into Last Palaeolithic, First Mesolithic, Last Mesolithic and First Neolithic typologies is much more amorphous than a sharp chronological boundary would suggest. Nominally, the period from 11,700BP to 7000BP, from the start of the Holocene to the end of the greatest rate of environmental change (Chapter Three), is adopted as the temporal focus, but evidence from the end of the LGM to that from well into the early Neolithic will be considered to contextualise and better frame the Mesolithic period.

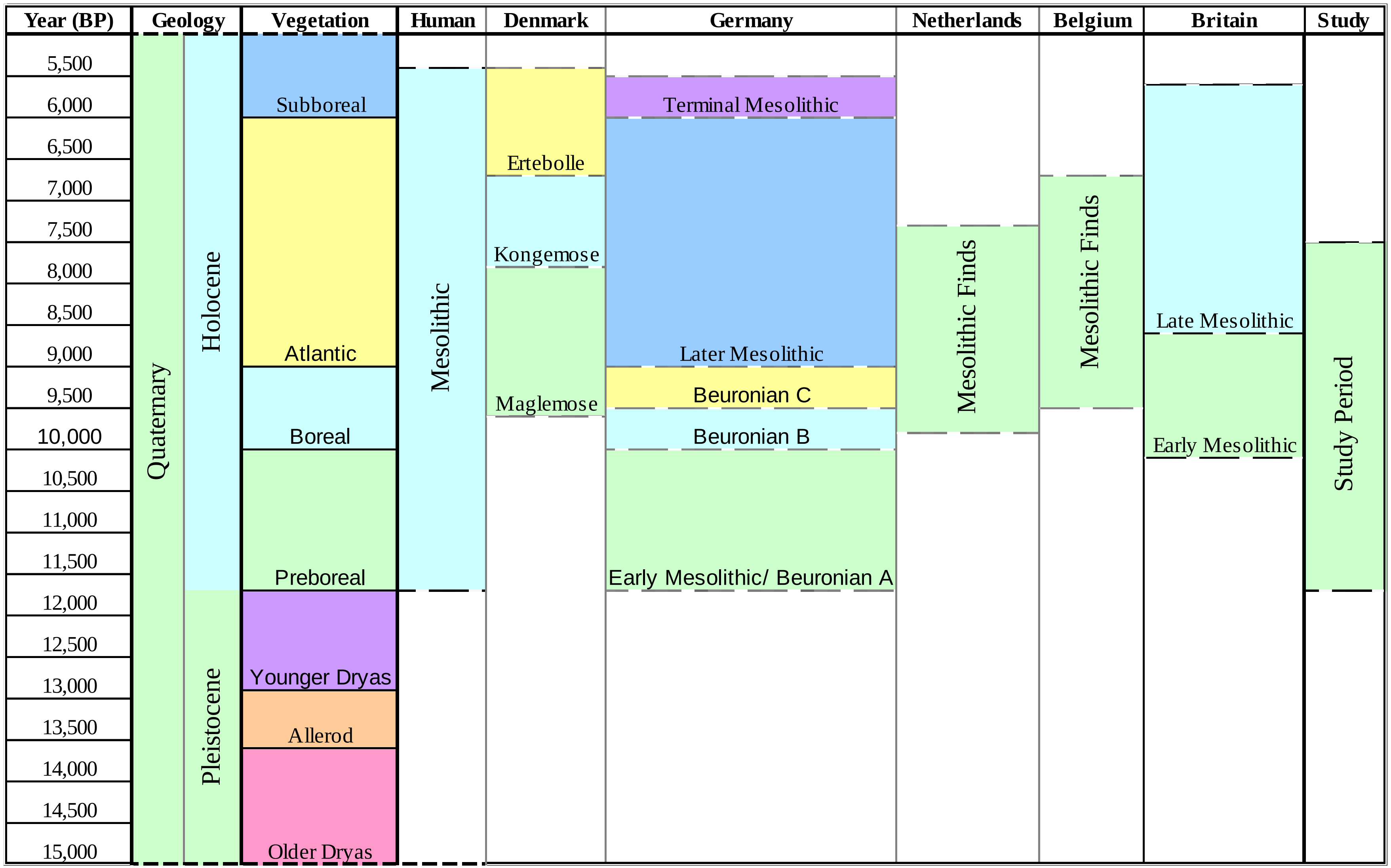

Table 1. *Chart depicting time-transgressive chronology of Mesolithic across southern North Sea basin*

To begin with, this thesis looks at the development trajectory of Mesolithic archaeology, from Westropp (1866) to Clark (1936) to Price (1991) to Bailey and Spikins (2008), to explore how we have thought of the Mesolithic in the past, what types of evidence have been considered and with which theoretical premises and to establish if these conceptualisations were adequate for tackling our present goals for interpreting the past (Chapter Two). This history of ideas strongly suggests that a multi-scalar epistemology tying together the evidence and ideas from the multiplicity of specialisms now available to us would provide the best, most fully rounded interpretations of the Mesolithic in this region.

This, the creation of a multiscalar, multidisciplinary approach to exploring the Mesolithic in the southern North Sea basin with the purpose of redefining the ways in which we characterise this period. By re-constructing our conceptualisations of the Mesolithic, we can build a platform which better reflects both the datasets which we currently, and have in the past, relied upon to interpret life and people during this period, and the questions we hope to ask of these records.

Integrating scales and disciplines of data introduces the need to organise a complex network of inter-related datasets and entangled ideologies. A linear structure of nested scales, macro to meso to micro, is a convenient way of presenting data, one which is, in fact, adopted in this dissertation, but for the purposes of analysis and interpretation, a theoretical framework which better recognises the heterarchy of inputs is required to avoid creating artificial distinctions between components which are vitally enmeshed. Macro-scale environmental patterns, for instance, can drive those seen at the meso-scale, but meso-scale morphologies shape the expression of these patterns, and, therefore, their presence in the consciousness of people within the landscapes. This relationship is recursive and inalienable, and is repeated throughout the data sources and scales considered in this thesis.

The principles of a symmetrical archaeology are, therefore, used as a methodological tool by which this amalgamated network can be structured without creating synthetically rigid divisions or false priorities of one scale over another. While symmetrical archaeology was initially developed as a means of resolving the division between nature and culture (Webmore 2007; Witmore 2007), in this thesis, the same tenets will be used to integrate a macro, meso and micro-scale approach. Symmetrical archaeology argues that there is no definable division between nature and culture, but that these exist only together and only on a spectrum (Witmore 2007). This concept will be extrapolated to the entanglements seen in this study; the macro, meso and micro-scales will be seen to be incomplete without each other, study areas and chronologies are defined along a contextualising spectrum, strains of evidence will be considered as being entangled within the full network of palaeoenvironmental and archaeological records. A critique of symmetrical archaeology stemming from discussion at a recent archaeological conference (The Northern Hunter Gatherer Forum, 2008) was that, though arguing that such ideas lie along a spectrum, they are still made separate from their contexts by being labelled as nature or culture, or as macro, meso or micro. While this is true, it is the argument in this thesis that research and concepts related to research must still be constrained into definable, manageable pieces so that they can be adequately explored and disseminated. In this way, the use of a symmetrical approach to the Mesolithic archaeology considered in this project should be considered more of a tool for organising and focusing the approach to a large and diverse net of information. The goal of this methodology is to consider each piece individually which still recognising its position in the wider scope of data, how it influences and is influenced by the components around it. The theory of symmetrical archaeology supports the incorporation of past data, methods and theories and creates a framework actively open to the inclusion of additional and future information. It recognises a continuous, entangled spectrum but still allows research to be defined for the practical purposes of archaeological interpretation (Chapter Two).

Figure 2. *Symmetry 22* (Escher 1938)

The notion of Mesolithic perception of environmental change stands out, in the review of the history and current status of Mesolithic Archaeology, as a key component of understanding the human experience during this time period. It, therefore, becomes an opening through which we can break into the entangled continuum of information available for defining the Mesolithic as a period (Chapter Two). It is the lens by which we can move between analytical scales and disciplines, interpreting the effect of each data point on how we understand people and their experience of dwelling within, as part of, the Mesolithic landscape in the developing southern North Sea basin.

The macro-environmental patterns; ice retreat, eustatic sea-level rise, vegetational regime changes; are considered in Chapter Three as a means of evaluating what we can learn from a broad approach to the palaeoenvironmental record of the southern North Sea basin. After these are amalgamated to define the spatial extent of the study area, the archaeology of this basin is then considered on the macro-scale. It is demonstrated that though the literature argues the patch-work, highly varied nature of the Mesolithic in this region, this is not reflected in the generalisations we use to characterise the period and to guide our interpretations. Instead, an intuitive model of step-wise progression from the Palaeolithic to the Neolithic, based mainly in the record from Denmark and disputed by evidence from elsewhere in the study area, is imposed over the entire region. While the roots of this generalisation are considered, it is not a sufficient characterisation for the Mesolithic over the breadth of the southern North Sea. At the macro-scale, key patterns are established which both unify the region as a useful study area, and highlight key reversals in the patterns which are fruitful for consideration of what makes the Mesolithic period a unique era for research and archaeological interpretation.

The smooth, step-wise pattern conventionally used to frame the Mesolithic period is further challenged by the meso-scale archaeology addressed in Chapter Four. The large degree of diversity which can be seen in the cultural patterns of tool technologies, mobility patterns and habitation sizes and structures is explored in conjunction with the meso-scale palaeoenvironmental evidence across the basin. The varied nature of the record as seen on the meso-scale emphasised the need to divide the study region along parameters related to the research questions, related to the changing palaeoenvironment. Diffuse regions based on isostatic uplift and subsidence, as introduced above, were applied to provide spatial focus to the meso-scale analysis in a way which reflected the palaeoenvironmental diversity in the southern North Sea basin. The diversity seen across the southern North Sea Mesolithic further stresses the need for interplay between epistemological scales in order to build better interpretations of the Mesolithic.

The micro-scale River Waveney Valley landscape, framed by the rivers Waveney, Yare and Bure in East Anglia (Figure 4), is examined in order to ascertain the impacts of the macro and meso patterns on the human scale, and to engage with the reality of primary archaeological research (Chapters Five and Six). The ideologies developed in Chapter Two are, thereby, carried through each scale of approach applied to the available Mesolithic material for the defined extent of the southern North Sea basin. To analyse the one-to-one scale interaction between Mesolithic people and their environments, a stratigraphic model of the Waveney valley geology was created from a database of nearly 2000 boreholes. Palaeoenvironmental data, available from a subset of these boreholes, was then used in conjunction with this model to build an image of the changing environmental textures (Chapters Two, Five and Six) of this landscape. The locations and assemblage sizes of lithic scatters dated to the Mesolithic were then plotted against the stratigraphic model to develop an understanding of landscape use during this time period. The stratigraphy of the river valley suggested a series of five key time-slices for which the lithological and palaeoenvironmental evidence was compared against the archaeological record for the region. This allowed integration of disparate datasets despite unresolved complications in comparing the resolution of the available chronologies for these records.

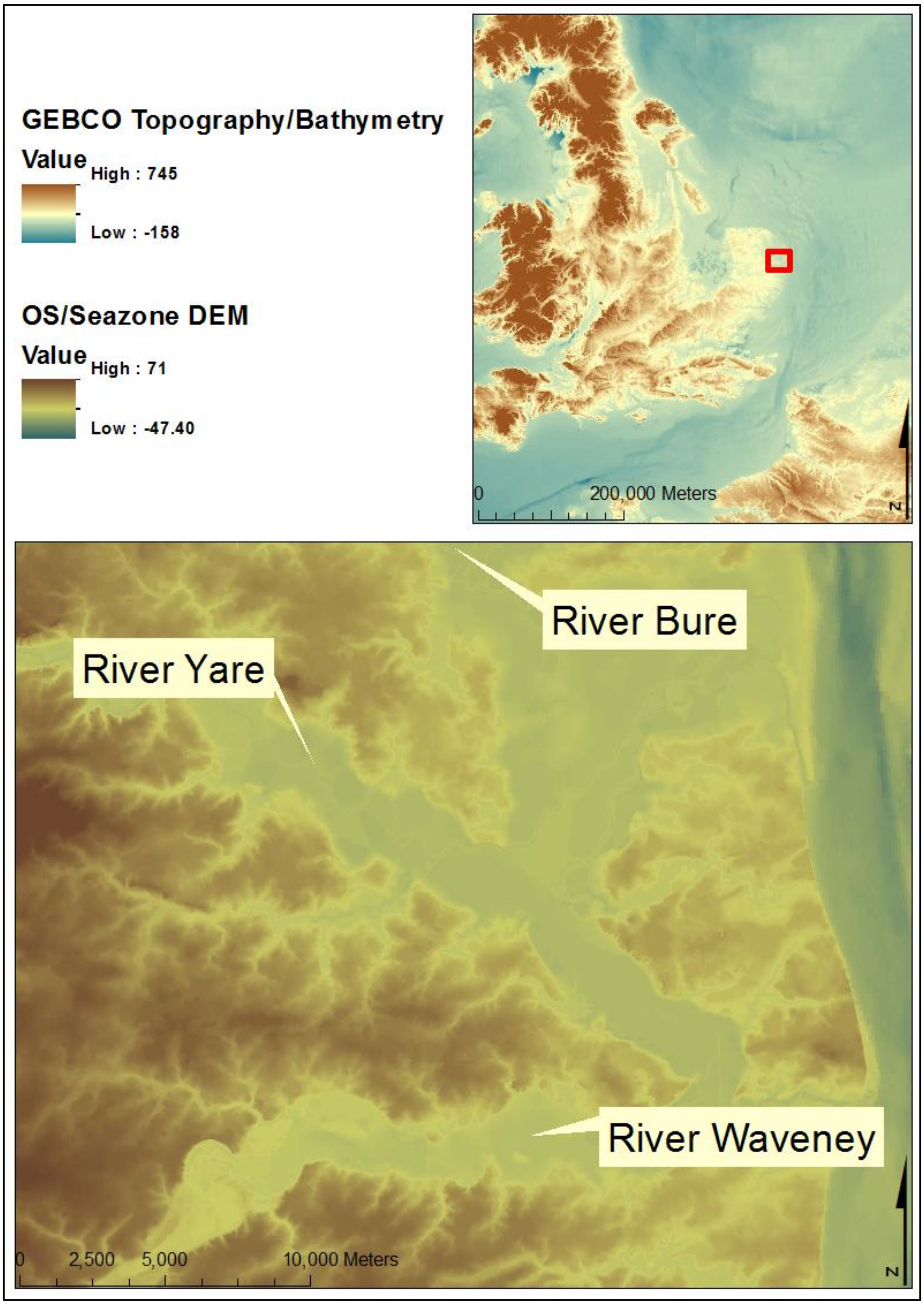

Figure 3. *Location of the Waveney Valley micro-scale study area*

The lasting impression from this micro-scale approach is one of great spatio-temporal dynamism. The expression of macro and meso scale environmental shifts was highly varied across the Waveney valley and the rate of change was equally diverse. The environmental texture perceived in the course of the daily actions of Mesolithic people in this landscape were diverse across both time and space; as people travelled across the landscape, grew older and created inter-generational understandings of their surroundings, temporality and change would have been at the forefront of their awareness. The incorporation of the macro, meso and micro-scale approaches used in this dissertation to create a multi-scalar epistemology, substantiates this idea of a perceived, experienced and perpetuated dynamism as the key unifying, defining factor for the Mesolithic period. It would have been at the root of how people considered themselves and their surroundings.

People moved and lived within the textures created by the macro, meso and micro scales of change across each dimension of life during this period. It will be argued that their perception of these shifts would have been fundamental to their experiences of the landscape and, therefore, to their sense of identity and belonging to the world. This is what is achieved from a multi-scalar, multi-disciplinary, symmetrical approach to Mesolithic research: a clear understanding that movement and dynamism on each axis of life provides the fundamental definition of the Mesolithic (Chapter Seven). It is a sustainable definition, borne out in the archaeology at each scale of study and creates a unique conceptualisation of the period distinct from those on either side. Importantly, this is a definition which was created not only from the perspective of research, an interpretation of the available evidence, but also from what we can understand to have been an active part of the ontological experience of the Mesolithic world.

Therefore, the symmetrical, multi-scalar, multi-disciplinary approach is borne out to be useful, to aid a meaningful reconceptualisation of the Mesolithic. Finally, it will be argued that the pervasive idea of motion should be reflected in the process of our archaeology (Chapter Seven). Creating fluid movement between scales and disciplines creates an archaeological practice more in keeping with how we can, now, better conceive of the period itself and allows greater insight into the Mesolithic experience of this region. As we begin to interpret data from the currently submerged North Sea landscape and hope to so tie together our extant research from the coastal margins of this basin, a research framework and fundamental definition which is most fully sympathetic with the period being studied will become only more important.

Chapter Two: The Mesolithic

The Mesolithic is a constructed idea of the past, created and recreated many times since the start of Mesolithic archaeology. This chapter sets out to look at how we have previously thought about this period in order to better understand why we choose the Mesolithic we now describe in our literature. Far from being a passive academic background, incorporating this history into current research helps to avoid unnecessary oscillations between fashionable data sources and methodologies, allowing us to efficiently move forward. Therefore, the first goal of this chapter is to build an understanding of how we have created the Mesolithic in the past and how we can improve this construction in the future. The history and current research goals of Mesolithic archaeology highlight the many data sources and specialisms which have been used to build interpretations. The second goal of this chapter, therefore, is to offer a means of organising this range of data, methods and theoretical inputs. Symmetrical archaeology has been chosen as a well-matched fit with the ideals of Mesolithic archaeology. When applied as a methodological tool, it can offer a useful means of structuring the network of disparate data sources and scales associated with studying the Mesolithic. The idea of perception of the environment is then offered as a route by which we can tack through this network, shaping a fuller, better integrated conceptualization of this period. Perception allows us to analyse and interpret each available data source putting people at the forefront of our ideologies rather than latterly reincorporating them into our stories, into our newly recreated Mesolithic.

1850s

Early prehistory was not subdivided into chronological units until the mid 1800s. The idea of an independent Mesolithic period took the longest of the three proposed major divisions to gain acceptance. In 1865, Lubbock proposed two phases of prehistory: Palaeolithic and Neolithic (Lubbock 1865, 2-3) based on “two qualitatively different kinds of stone implements; one was characterized by a rough, crude chipping technique, while the other featured fine delicate flaking that produced a smooth and often polished surface” (Czarnik 1976, 60). During the same period, Hodder Westropp was seeking ways to promote his theory of a Cycle of Development (1866) in which “all peoples were on aggregate, equally intelligent and equally capable of producing similar artefacts, institutions and so on”; that broadly similar processes produced similar developments (Nicholson 1983, 206). To express this equality and support his theory, he articulated different phases of material culture which he observed in museum collections of stone artefacts (Nicholson 1983, 206). In doing so, he observed three distinct stages of stone implements;

> *"1. The flint implements of the gravel drift evidently used by man in his lowest and most barbarous grade, 2. The flint implements found in Ireland and Denmark which belonged to a people who lived by the chase, 3. Polished stone implements, which mark a more advanced stage, perhaps a pastoral age. The following terms may be used to distinguish them:-- Palaeolithic, Mesolithic, Kainolithic"*
> *Westropp (1866, 291)*

Lubbock had allowed for a similar middle period based on material he had observed in excavations, but did not explicitly define this difference (Rowley-Conwy 1996, 740). Evans following from Lubbock's publication, like Westropp, defined 'Implements of the Palaeolithic' and 'Implements of the Neolithic', leaving leeway in between for an indistinct and unnamed middle period (Evans, 1872). Finally, Westropp promoted and greatly elaborated upon the argument and terminology for a middle stone age, Mesolithic, in his 1872 publication, *Prehistoric Phases,* which is regarded by many as the source for our modern terminology and initial connotations of this period (Czarnick 1976, Clark 1978, Rowley-Conwy 1996, Sturt 2006, Gaffney 2009). The terminology, 'Mesolithic' was resisted to some degree in mainstream archaeology for another fifty years and even arguments for this chronological distinction, a discrete period separate from the Palaeolithic and Neolithic and important for independent study, were not easily accepted. The hiatus theory, which claimed a dearth of evidence for human occupation of Europe between the Palaeolithic and Neolithic (Nicholson 1983, 209), substantially derailed the case for a middle prehistoric division. Statements regarding "cultural degeneration" or gaps in the prehistoric record are no longer meaningful for our understanding of the early Postglacial (Price 1983, 769) but, at the time, they took several decades to be negated (Nicholson 1983, 209), creating a contentious start for Mesolithic research. This shaky inception meant that from its earliest beginnings, the Mesolithic has felt ill-defined in terms of chronology and character, the implications of which were felt well into the next century. Indeed, we are still trying to achieve an adequate generalisation of what it meant to be uniquely Mesolithic in North West Europe.

Amongst those who accepted inhabitation and cultural development during the middle stone age, the argument for a technologically discrete period was still contested and this period was termed the 'Epipaleolithic', 'Transitional' or 'Early Neolithic'. Defining the Mesolithic was easier and more palatable in contrast to those periods on either side as the best preserved evidence available at the time could be used to support a theory of progression from the recognized later Palaeolithic traditions to those accepted as belonging to the Neolithic. Where the agents behind the lithic artefacts were considered, their experience of the world was assumed to have been only negligibly different from that interpreted for the Upper Palaeolithic or nascent Neolithic. The transitional terminology and the categorization of this period solely in difference to those on either temporal boundary created false connotations which have impeded Mesolithic research and continue to leave a mark on our generalizations of this time period today.

Conceiving the Mesolithic as a transitional period is a data artefact of the ways in which we, as researchers, have structured our categorization of prehistory. It is a problem analogous to that discussed for the inappropriate use of the term 'land-bridge' in archaeology to denote a landscape, usually now submerged, which links two known centres of occupation. The notion of a land-bridge is presented in the context of migration of past populations over landscapes which are now submerged: "Settlement in Ireland began around 8000 BC, when the first hunter-gatherers arrived from Scotland and continental Europe, most likely following the coastlines and what would have been a dry land bridge. The land bridge was the likely result of the low sea levels of the last glacial maximum" (Freire 2008, 6), "As glaciers melted during the terminal Pleistocene, archaeological sites present either on the land bridge or along the coast would have been inundated" (Carper 2007, 779). While these landscapes did once connect two currently dry-land locations along a hypothesised migratory path, as Flemming says, '[These areas] constitute a large area of potential terrain which could support vegetation, fauna and coastal resources exploitable by Palaeolithic and Mesolithic peoples… [and] should not be regarded as a land bridge, but as a territory with its own special environmental conditions, sequence of climatic changes, culture and evolution of technologies' (Flemming 2004, 120). Following from Ingold, while places have centres, or are centres, they have no innate boundaries, “boundaries of various kinds may be drawn in the landscape… but such boundaries are not a condition for the constitution of the places on either side of them” (Ingold 1993, 156). Borders should be created in relation to the activity of the people for whom it is experienced as such (Ingold 1993, 157). By conceiving of a time period or landscape as something to be passed through between two endpoints, we undermine our ability as archaeologists to study the perception of the inhabitants of these environments. As Ingold says, it is unlikely that in moving from A to B, one will question whether he is now in A or B (Ingold 1993, 157). Thus, defining this time period as merely a transitional interlude can weaken of any interpretations of the perception Mesolithic coastal communities.

While the use of the terminology ‘Transitional’ and even ‘Epipalaeolithic’ has been largely surmounted in Britain over the last few decades, ‘Epipalaeolithic’ continues to be widely used elsewhere in the world (e.g. Jorda 2011, Mulazazani 2010, Martin 2010). Even where these terms have been discarded, the notion of the Mesolithic as a series of progressive steps from one period to the next still exists in our generalizations and in the datasets we prioritize. We characterize this period as the time during which patterns of life became more recognizable to our own, where people changed from an unfamiliar hunter-gatherer life style into settled, agrarian habits. The intuitive resonance of this model establishes a trend of championing and developing evidence which supports this theory and largely discarding those regional datasets that do not. While this pattern will be challenged in Chapter Four, it is the most fundamental result of the ways in which Mesolithic research was established.

Through Lubbock, Westropp and Evans, the study of the Mesolithic was founded in the notation of a distinct period in the evolution of tool typologies. The divisions in prehistoric material, noted by these researchers, were disseminated into a strong continental tradition, in this period, of culture-history. In Europe especially, the predilection for dividing past societies into cultural groups based exclusively on the available material culture was already established (Burke 2004, Morris 2000); in Britain, this tradition was less dominant. While in both areas our first conceptualizations of this period were orientated around the collection and sequencing of lithic materials, this difference impacted the conceptualizations of the Mesolithic later arising from the incorporation of environmental data.

The materials typologised by Lubbock, Westropp and Evans were loosely dated, often, depending on the source-region collected from surface scatters and therefore out of any stratigraphic context. Predating radiocarbon dating, neither was there an opportunity to accurately date even those finds which were taken from excavations. Even today, a large percentage of artefacts from the National Monuments Record (NMR) and John Wymer's (1977) Gazetteer of lithic finds in Britain are simply attributed to 'prehistory' as no further definitive classification is possible. From Westropp's early perspective, then, the Mesolithic was not so much about the people inhabiting this chronological horizon, nor about their surroundings, but was solely based in a loosely dated and generalized progression of tool traditions. At this point, it was the material that mattered, not necessarily the individuals who created, used, interacted with and finally deposited these lithics.

1930s

While evidence pointing to the existence of a middle stone age period had been noted and debated since the mid 1800s, it wasn't until Clark's (1932) publication in which he defined this period chronologically as lying "between the close of the Pleistocene and the arrival of the Neolithic arts of life", that the idea of the Mesolithic really began to take hold in a stable way (Clark 1932, 6). He noted that the "Mesolithic Age as a whole is demarcated from the Upper Palaeolithic by a great geological and climatic divide" (Clark 1932, 6). This marked the full adoption of the term into prehistoric archaeology (Gaffney 2009, 16) but also, critically, the introduction of two key elements in how we approach Mesolithic Archaeology; the ecological focus to research, and, related to this, the idea of moving from an environmental opening boundary to a cultural close. This second point not only underscored the earlier ideas of the Mesolithic as a transitional chronological step, but also illustrated dramatically the large difficulties in assigning temporal thresholds to this period.

At the time of publishing his 1932 book, Clark was also creating the Fenland Research Committee, formed of "archaeological workers who sadly felt the lack of essential geological, botanical and zoological knowledge" (Clark 1932b). Clark's appreciation of the extent of post-glacial climate change combined with the refinements in chronology, pollen analysis and stratigraphic approaches during and after the 1930s drove a focus on the relationship between the environment and social change (Smith 1995, 14). He began infilling the research from the later 1800s, categorising people according to lithics alone, with an ecological story. He drew on data beyond the identifiable sequences of material culture. Through this work, Clark first introduced to Mesolithic archaeology, the importance of multidisciplinarity and drawing together a range of data sources to the interpretation of prehistory.

Clark interpreted the concurrent technological developments noted by Westropp in 1866 and 1872 as being a direct result of the new rates of environmental change (Gaffney 2009, 18). In Britain, with its less-substantial tradition of culture history, Clark's work, therefore, came to signify the exclusive importance of the relationship between people and the environment in determining our ideology of the Mesolithic. Whereas research on the continent was already focused to a greater degree on the idea of developing stories about people based on material artefacts, this was not so true in Britain and research was largely swayed to environmental data. The theory of direct causality between the environment and culture remained unchallenged until Hardesty's 1977 publication on environmental determinism in anthropology.

Equally lending weight to the movement to incorporate strong ecological approaches in Mesolithic Archaeology during the early to mid 1900s was the introduction into archaeological practice of radio carbon dating. This affected archaeological methodology at large, but was specifically influential in Mesolithic research in highlighting the limitations imposed by the very loose dates attributable to artefacts from this period. Suddenly, it was possible to date, accurately and precisely, the environmental context found around artefacts, and further to supply timestamps to stratigraphic steps seen in excavations. This means that not only were artefacts more likely to be datable, but changes in the surrounding environments of the Mesolithic technological developments could be pinpointed. This sudden influx of newly-available data coupled with Clark's personal enthusiasm for environmental research cemented the predominance of an environmental basis for Mesolithic research in Britain.

Clark's work continues to be beguiling to us today, as it echoes the insistence on multidisciplinary incorporation of a wide range of data sources. His approach created the need for multiple specialists to work alongside each other in Mesolithic archaeology;

palynologists, scientific dating specialists, archaeobotanists, etc. Today, privileged with these specialisms, we are now trying to pull them back together to recreate a fuller conceptualization of the Mesolithic drawing on each of these threads of data simultaneously. A preference for the micro-scale approach seen in later phases of Mesolithic archaeology can also be seen to stem from Clark's total-archaeology approach, of high-resolution, empirical data. The 1930s, therefore, largely shaped Mesolithic archaeology for the remainder of the century and further, steering the focus to a direct environmental correlate to cultural adaptations, concentrating on the collection of dates and data, and conceiving of the Mesolithic as that period situated between a major environmental development, the start of the Holocene, and an equally large cultural shift, the beginning of the Neolithic. However, the conceptualisation of this period as a loosely defined cultural entity had not yet been fully overcome. Indeed, prefacing Clark's seminal text, Burkitt (1932) described the Mesolithic as a "a dustbin into which any awkward industry which does not seem to belong to any period could be cast." The shape of the Mesolithic had been roughed out, but not yet refined.

Clark's definition, no matter how formative and vital to the evolution of Mesolithic archaeology, is further open to critique, as it lacks an inclusion of individual agency and refinement of the relationship between people and the environment. It is no longer an adequate conceptualization of the Mesolithic. While the description and analysis of the Mesolithic environment is crucial to interpretations of life in this period, a resource-based environmental determinism is not adequate. A direct correlation between ecological stimulus and social response does not exist. Prehistory was populated by individuals and communities who interacted with the changes occurring in their environment, and models which evade the active engagement of people in this period create a falsely flat rendering of the Mesolithic experience of the world. To incorporate people, and the "importance of a subjective perception of the landscape" Wheatley proposes that we must accept two propositions about the interactions of people and their environments:

1) *"That people do not interact directly with their environment, and they do not respond like automata to external environmental stimuli. This does not imply that factors such as proximity to water, degree of shelter or the availability of natural resources do not impinge on human consciousness...*
2) *That people do first perceive their surroundings and place on it a cultural interpretation; this interpretation is constrained by cultural preconceptions. Only then do people react to this perceived environment, and then they react to it in a similarly culture- and context- specific manner" (Wheatley 1992, 35).*

In these propositions, he affirms the importance of an environmental context, but also asserts the social component of human engagement with their surroundings. This is where Clark's paradigm of a solely resource-based, direct response to ecological change is insufficient. Instead, Hardesty (1977) promoted a theory of environmental *possibilism* which was later echoed by Bell and Walker (1992 and 2005). Possibilism theorizes that the environment plays a role in why some features of culture occur while others do not; it limits and modifies cultures without *imposing* developments. The environment is established as an influential component of the Mesolithic, but does not suppress human agency. However, arguments for the integration of the individual and an interactive, entangled nature-culture dynamic were, at this point, still well into Mesolithic Archaeology's future.

1960s

With the large-scale adoption of Processual archaeology in the 1960s, Mesolithic archaeology found itself very much on-message for the wider goals of mainstream research. Processualism was based in the ideals of empiricism. Mainstream archaeology began to concentrate fully on scientific process, data collection and testable hypotheses and called itself the New Archaeology (Trigger 1989). This movement stemmed from a reaction against the earlier satisfaction with cataloguing artefact sequences, and instead questioned process and the systems which drive change. In the case of processualists, this most often focused on techno-environmental patterns; examining the technology available coupled with environmental resource availability. In this way Clark's foundations for Mesolithic archaeology were perfectly matched with this new philosophy of research. Mesolithic researchers were already involved in the collection of datable material and environmental context, focusing on stratigraphy and the systems of environmental change in relationship with artefact finds.

During the new processual archaeology, Mesolithic research stayed very much involved in the site scale, the micro-approach at which data could be collected, analysed and verified. Clark's idea of total archaeology found a solid foothold in the arguments for empiricism. Generalization from a complete set of evidence to build up a scientific case for interpretation took precedence in archaeological methodology. This approach continues to influence our conceptualizations of an archaeological site in terms of studying the Mesolithic, as well as steering the epistemological argument for research conducted over a highly restricted spatial extent on a very thorough basis, creating a strong record for what we can learn about a limited area. While many processualists in mainstream archaeology created grand narratives, applying a generalising approach and looking across a wider scale, Clark's influence and focus on creating a complete work-up for each site continued to root Mesolithic archaeology in the micro-scale.

Processualism and Mesolithic archaeology, during this movement, were still open to critiques of environmental determinism. Despite the focus on process, these failed to recognise the role of the individual or of human agency in the midst of these systems. This continued the paradigm of an unwitting prehistoric actor responding solely to external influences with no engaged interaction, control or direction of his or her own. For all its thoroughness, processual archaeology did not encompass a populated, actively perceived and dwelled in Mesolithic landscape.

1980s to early 1990s

The ideals of the New Archaeology, through the critiques of Hardesty (1977), Hodder (1982,1990) and others (e.g. Thomas 1996, Tilley 1989) gave way to the theoretical angle we now call post-processualism. The individual became all and scientific approaches and evidence were regarded suspiciously by some practitioners (Thomas 1991). The Science Wars, a series of debates between natural and social scientists underscored the tension between the two schools of thought (e.g. Sokal 1996; Boghossian 1998; Gross 1998; Ruse 1998; Soble 1998; Sullivan 1998, 1999). Post-processualist archaeologists approached interpretations largely from a subjective angle where the human element and experience of the world, the symbolic and social were the primary driving questions behind research.

In reemphasizing the importance and role of the subject in archaeology, post-processualism reinvigorated the debate over subject and object-orientated points of view. While not a new discussion, this question having been contested in philosophy for centuries and perhaps taken to a pinnacle earlier in the century by writers such as Heidegger (1927) and Merleau-Ponty (1945), it became an especially important issue for archaeologists as we reconstruct the past and interpret the subject exclusively from objects. The shift in ideology about the influence of the environment, external, object-based stimulus, on past subjects especially accentuates this argument.

Subject/Object Divide

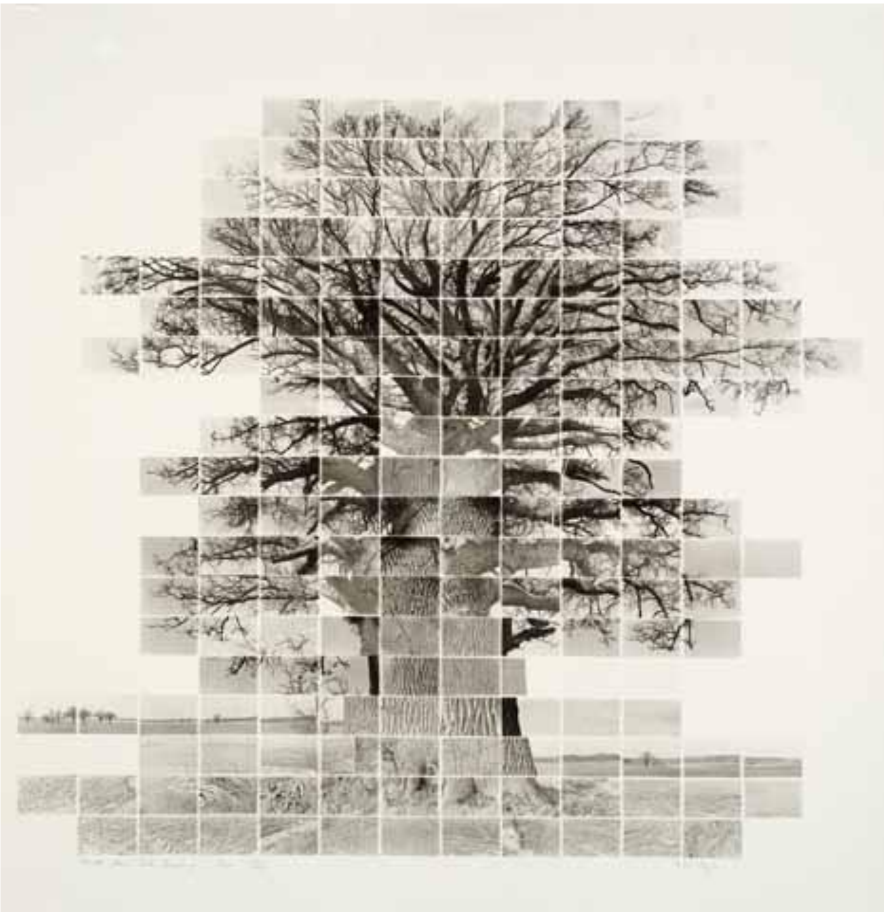

Figure 4. *4th short film depicting a tree.* Two hundred different negatives on the same tree (Myles 2003)

This debate centres on the impact that objects have on the subjects, generally humans though in some cases animals are included in this categorization, who perceive them, and on the effect of the subject's perception on the object. "The world (reality) has been viewed in terms of different categories, namely in terms of active animate subjects and passive inanimate objects. Society- the world of active subjects – has been viewed in terms of human beings… while, Nature—the world of passive objects – has been viewed in terms of nonhumans [including the environment, landscapes, animals]" (Dolwick 2008, 17). Crystallised by the aphorism, "If a tree falls in the woods with no one around to hear it, does it make a sound?" this debate divides theorists who would privilege the role of the object and a 'natural' unmodified backdrop to human life, from those who favour the subject and an interactive relationship with the environment. The above adage is often attributed to George Berkeley who promoted dominance of the subject in his theory of 'immaterialism', later called 'subjective idealism' (Berkeley 1710).

In the subject-based theory of phenomenology refined by Heidegger and Merleau-Ponty, an object is defined entirely by the experiences which have shaped the perceiver. In Heidegger's terminology: the world exists only in the presence of Dasein or being-in-the-world, which is the idea that humans cannot be removed from the context of the world in which they dwell (Heidegger 1971). This is a Platonic view of the world, in which objects do not exist without subjects. In this tradition, Harman (2007, 163) says, "A house is a completely different thing when viewed by a bird, by fifteen different humans standing in fifteen different places, and by a spy satellite". As depicted by Figure 4, therefore, a tree viewed by two hundred different people is not a distinct object separate from the people observing it, but is a composite of their perspectives; similarly, the Mesolithic as interpreted by two hundred archaeologists will not be the same. Our own experiences colour our perspectives. The subjective argument, therefore, is that the subject has more influence over objects than objects have ability to modify the experience of subjects. Objects; things, artefacts, tools, components of the natural environment, items; cannot relate to each other independently from subjects (Heidegger 1927, Merleau-Ponty 1962).

Harman, a proponent of an object-dominated conceptualization of the world, argues against this saying that objects, in creating an environment and forming a subject's experience of interaction with things as well as people, do have agency and, therefore, do relate to each other independent of Dasein (Harman 2007, 162). From this, stems the argument for a broader allowance for agency which includes inanimate objects (Olsen 2003, 89). This contention is at the basis of Actor-Network Theory as developed by Latour (1987, 2005), Callon (1985) and Law (1992), in which "people-and-things: archaeologists, stone tools, pots, artefacts, animals, computers, satellites… are not partitioned into different niches of different worlds, given certain meanings and then limited to only certain kinds of relationships. Instead they have many different meanings and enter into many different relationships" (Dolwick 2008, 36).

Prehistoric archaeology, particularly rooted in the description, analysis and interpretation of material culture, of objects, can be critiqued as privileging objects over subjects. This can be especially true in Mesolithic archaeology, which due to the differential preservation of 'stone and bone' (Gaffney 2007, 18), has been characterized as having a diminished richness of readily apparent cultural artefacts as compared to the Neolithic. "All too often in archaeology, discussions are of houses, or animals, or trees, or worst of all, stone tools. Of course, people float in the background… but one of the challenges of archaeology is establishing an appropriate balance between the necessary critical attention to the material, a sustaining the visibility of human lives in the past" (Warren 2005, 134). This disengagement of objects and subjects arises in palaeoenvironmental research where discussions of the environment can either disregard interaction with people beyond fundamental resource acquisition or can create an environmentally determinist model in which people have no agency to react beyond ecological stimulus. Such is the critique for processualism and Clark's construction of the Mesolithic; in this system the environment and people do not interact or engage each other as members of the same, highly amalgamated world.

However, the clarity of thought and expression advocating and explaining the integration of people-and-things within the context of Mesolithic Archaeology had not yet been achieved at this point. Therefore, while the tenets of post-processual archaeology and the primacy of the subject were readily adopted and carried forward in mainstream archaeology, Mesolithic archaeology, with its century-old basis in evidence, empiricism and the environmental was much more resistant to this new way of thinking. Writers in Neolithic archaeology, with its better preservation of accessibly cultural artefacts, could and did more readily adopt these new conventions (Thomas 1991). Research turned heavily against ecological approaches as they were dubbed environmentally determinist and considered dehumanizing (Bruck 2005, 58). Julian Thomas (1996, 26) described ecological archaeology as ‘an approach which is almost certain to bias the account in favour of environmental determinism’. This rejection of palaeoenvironmental research was a defining movement, particularly within Neolithic archaeology. However, data collection, site-scale analysis, and a predilection for palaeoenvironmental research with goals of mapping resource availability persisted in Mesolithic studies, with little apology or contrition against accusations of environmental determinism and the devaluation of people (i.e. Price 1991, Zvelebil 1995). This left Mesolithic Archaeology in a somewhat theoretically backward position compared to other studies of prehistory; a reputation it may still be ameliorating. However, it has also left a legacy of a scientifically rigorous approach, which, as we now move beyond the post-processual movement into a period more focused on integration of multiple data sources and cross-disciplinarity, has helped to create unique opportunities for Mesolithic researchers to build on the strong platform of ecological research and now probe for indications of people, communities, and cultures.

The ‘site’ in the 1980s

In addition to questioning the different roles of subjects and objects in an archaeological context, this period of time also saw Robert Foley (1981) spark a challenge to the extant conceptions of the ‘archaeological site’ and primacy of the micro-scale by writing about ‘off-site archaeology’, looking at the ‘blank spaces’ between lithic scatters and considering what these meant for the archaeological record. This idea of connectivity between sites and the importance of areas without known artefact finds between denser distributions offered an opportunity to draw out from the micro approach into a broader understanding of a landscape. This helped to provide context and additional sources of insight into the prehistoric experience and understandings of space. It also very importantly challenged what we meant by the term ‘site’ and how, then, we should frame the spatial extent of our archaeological research. By looking at the ‘blank spaces’ between lithic scatters, a site can range from a defined cluster of lithic scatters to individual lithics found within a landscape; the incorporation of environmental data, with no such set boundaries, changing over a spatially-diffuse range, further complicates what we mean by the micro-scale. While Mesolithic archaeology was not an early adopter of these new theories, the basis for a future expansion of research aims and questions, exploring people, agency and different scales of study, had been laid. The commitment to a total coverage-approach, based in

Clark's approach (e.g. 1932), to studying the Mesolithic was being challenged. By critically confronting the exclusivity of the site-scale, an opportunity to re-examine the types and resolutions of evidence required to meaningfully interpret the Mesolithic was being created. In some ways, Foley's (1981) idea of off-site archaeology exploded lithic research into the macro-scale, forcing analysis across a broad landscape. In other ways it also again confronted the definition of the micro-scale by demonstrating the importance of a single lithic within a landscape; the very micro micro-scale. By the end of the post-processual fervour, Mesolithic archaeologists were left with a wealth of prior ecological research, the data, techniques and theories associated with this evidence and had also been exposed to the changing thought processes behind the role of subjects and objects in forming our conceptualizations of the past and the also the new possibilities for new ways of spatially configuring prehistoric research. At this time, a tipping point was reached, and moving into the end of the century and the beginning of a new one, Mesolithic archaeology expanded widely in the scope and variety of research undertaken. The specialisms first promoted in the 1930s, were now being developed in their own directions. This has allowed us many more angles from which to view the Mesolithic, a much greater range of ideas on how to approach the material record from this period. Different scales of research and new questions could be asked of the robust datasets which had been accrued up to this point. While the record is always, necessarily, being expanded, this mass of prior information allowed a subtle shift of focus onto interpretations of life and people in the Mesolithic, rather than on the need to acquire a large amount of additional data in order to build such understandings.

Later 1990s to 2000s

The new model of integration and expansion in Mesolithic research did not mean a rejection of past priorities as it had for some other sub-disciplines in archaeology. Rather than veering sharply away from a hereditary focus on lithic typologies or ecological resources, the new forays have built upon these traditions solidifying interpretations and clarifying our current goals and refining our most pressing research questions. Through the history of Mesolithic archaeology, we can more easily understand not only how we have come to our present conceptualizations, but also how these definitions are insufficient; why we want and need better, fuller interpretations of this period of prehistory.

Lithic Tradition

The analysis of Mesolithic artefacts has moved substantially beyond the initial cataloguing and sequencing of lithics to a variety of quantitative, qualitative and conceptual interpretations of this material. This has continued to refine our definitions of a Mesolithic site as well as the types of questions we can reasonably ask of our artefact datasets and how this material, therefore, influences the ways in which we think of this time period. In the new approaches to lithic material, "understanding what artefact scatters represent is not so much a methodological issue as a theoretical one" (Schofield 1991, 3). Prehistoric archaeology in particular is dependent on the artefact record to create understandings of the ways in which people lived. While there are other types of material culture in the artefact record lithic material is the most prolific and, therefore, the most extensively analysed, though research from the early 2000s (e.g. Conneller 2003), discussed below, has shown the potential for the symbolic interpretation of antler frontlets and other non-lithic remains. These new approaches to lithic materials demonstrate the shift in how we can now consider what a single artefact implies about the lives of Mesolithic individuals. This is Mesolithic archaeology building on Foley's (1981) earlier work demonstrating that even very small scatters and single artefacts contribute to the overall patterning of the archaeology and that where the archaeology isn't is as important as where it is. Even in using the material which has been considered since the very beginning of Mesolithic archaeology, we can further reconstruct the Mesolithic we study by asking much more specific and rigorous questions of this data. We are using new questions to address material culture across multiple scales to look at people, individuals and communities and their experiences, during this period, not just at the empirical evidence. In this way, we are focusing more on interpretation than on analysis.

A Quantitative Approach

Schofield (2006) has used analyses of the density of artefacts to define sites and to interpret, quantitatively, the occupation of landscapes. While the interpretation of artefact scatters recovered by surface collection has often been considered in terms of sites; here used to indicate "specific, discrete units generally considered to represent settlement locations" (Schofield 1991, 118), these can only be seen under certain conditions. There are rarely clear, defined, boundaries isolating lithic scatters from their surroundings.

"Human behaviour has occurred continuously across the landscape" (Schofield 1991, 118); this follows from Foley's (1981) off-site archaeology, discussed above. Further, as has been problematic since 1850, flint artefacts provide "little more than a broad date [and] certainly not enough to argue for true contemporaneity" (Schofield 1991, 118), and post-depositional processes such as arable farming have dispersed artefacts to the extent that scatters are no longer spatially distinct. This indicates that a site is rarely observed as a discrete unit, therefore, but is differentiated from surround scatter through archaeological decision.

Schofield (2006) moves this forward through stating that by looking at the relationship between artefact density and the composition of the artefact scatters, variations between types of waste, such as industrial or domestic, can be established. The adoption of a predictive approach to interpreting surface scatters can increase ability to distinguish between these. Geographical probability is determined by availability of sustenance resources and parameters increasing the likelihood of habitation or use of an area for manufacturing activities (Schofield 1991, 118). Through combining this geographical probability of the spatial location of the scatter for either industrial or domestic activity with the strength and nature of the relationship between artefact classes within an assemblage, the extent to which an area was inhabited may be ascertained. "Where geographical probability and archaeological observation [i.e. evidence for habitation] do not coincide, other factors may be seen to have influenced the nature of the settlement pattern… Where correlation is strong, least-cost location may be considered a possibility" (Schofield 1991, 128). In such a way, a predictive approach may be developed.

By presenting data in terms of density of scatter or as a percentage of the total collection, comparisons may be drawn on a variety of scales. Therefore, rather than looking for sites, Schofield argues for examination of "variation at three levels: 1) between collection units (fields) within each zone, 2) between zones, and 3) between regions" (Schofield 1991, 119). Comparison of assemblages or sites within these levels can aid the quantification of prehistoric habitation of a landscape, giving us insight into the Mesolithic use of landscape. This potential gain from this extends beyond resource attainment analysis and proffers an opportunity for understanding how Mesolithic people conceived of their landscape, conducted themselves within it and related to it. This approach overcomes the limitations of the material record and re-orientates the approach to question how the available data does reflect interaction with people in the prehistoric landscape.

Qualitative Interpretations of Lithic Scatters

Lesley McFadyen's (2006, 2007) work similarly applies the spatial distribution of known lithic scatters to examining cultural change through the Mesolithic. McFadyen (2006, 2007) looks to the implications of how and where people discarded or carried forward lithic material as an indicator for how they may have thought of their movement and habitation within their landscapes. Rather than quantifying the spatial definition of sites and the numerical percentages of what was deposited in them, she investigates qualitative patterning in the material and between the sites she has researched to consider why this material was left in these locations.

Her central argument is that lithic scatters should not be interpreted merely as discarded material which was, after deposition, no longer a component of Mesolithic life (McFadyen 2007). In the mobile, camp-to-camp framework of Mesolithic existence people did not carry all their material culture with them. "The discipline of archaeology has too often treated these objects as discarded and passive, as simply there, and assumed that they reflect or record events" (McFadyen 2007, 119). In this way, she advances the role of the Mesolithic object to further interpret the human subjects who interacted with them, combining the fundamentals of Mesolithic archaeology's history with lessons learned from the post-processual movement in the 1990s. She argues that Mesolithic landscapes were created and known in part through encounters with past materialities arguing that Mesolithic communities left behind material with intentions of revisitation and as a means of marking their place in the world. Depositions were not necessarily about discarding things into the past; by leaving items behind, they could make future connections. "People remembered how things connected to other things and other activities elsewhere" (McFadyen 2007, 125). Where they encountered other material accumulations, they added to them and allowed for future additions. Through this, identities could be formed and reformed in reaction to these interactions with depositions left by other mobile communities.

Mesolithic flints have been worked in a myriad of ways for different tasks. From the tool type, therefore, the activity can be inferred. This, and the relative size of the scatter, can be used to interpret whether the assemblage was created over a small amount of time or through multiple events. These assemblages are the material evidence for past practices: “working flint, hunting animals, the butchery of animals, the processing of plants, cutting wood, the preparation of food” (McFadyen 2007, 120), and as such are indicators of the processes of day-to-day Mesolithic life. “Assemblages of worked flint… connect to other things; animals (through microliths, scrapers, burins awls, flakes), trees (axes, scrapers), plants (microliths, serrated blades, flakes)” (McFadyen 2007, 120). McFadyen uses the concentrations of microliths away from sites where there is any evidence for their manufacture as an indication of the prior creation of tools for use at other locations. Tools for butchering or gathering plants were created at manufacturing sites and carried to butchering or gathering sites. “Each task, because of the way in which it interlocked with previous and future activities, and also because of how it connected to other materials… would have made material the presence of other people and other things elsewhere in the landscape” (McFadyen 2007, 121) Therefore, other spatial and temporal dimensions were component parts of the creation of flint assemblages. “Past people understood and were conscious of a space that materialized in this effective way” considering how their actions had a future direction or trajectory (McFadyen 2007, 119). These ideas will be essential to the discussion in Chapters Six and Seven, arguing that the dynamic change occurring throughout the Mesolithic landscape would have been fundamental to people’s creation of a sense of space and their place in the world. If people remembered how things connected to each other and to places within the landscape, then the idea that those places were constantly being altered would have affected how they conceived of the world, and thereby of themselves.

Symbolic Interpretations

Conneller’s (2001, 2003, 2005) work re-merges both the lithic and environmental traditions of Mesolithic Archaeology by revisiting Clark’s landmark site of Star Carr. Here, Conneller (2003) has studied the implications of the artefacts found there on both our past and renewing understandings of society in the Mesolithic. Her work has re-envisioned both the nature of seasonality and the symbolic importance of material culture at this time. The deposition of objects made from animals, such as antler frontlets, has been seen to have had ritual significance, indicating the strength of the relationship between people, animals and material culture in the Mesolithic. This new understanding highlights a new focus on artefacts made from a variety of raw materials, not just lithic tools. This interaction with animal-based material culture shows the significance that artefacts have beyond economic interpretations; that they have a symbolic importance which is newly being considered in conjunction with changing technologies. These, too, offer a strong opportunity to improve our understanding of the relative chronology of the Mesolithic, their unique characteristics allowing easier approximation of the ages of artefacts and, thereby the sites in which they are found. Her work also looks at lithic tools and discusses how each one reflects its place of origin and hypothesised previous owners (Conneller 2006). This applies the traditional tool typology categorizations and relative chronology to creating interpretations of culture and a careful reintegration of the Mesolithic subject. The changes in tools, therefore, signify changes in the process by which they have been made and in the individuals, communities and societies creating them. Much as in McFadyen's (2007) research, Conneller's interpretations extend to asking social questions of the extant data set; what part these artefacts played in the lives and experiences of the people who interacted with them, what role they have in the subject-object network of Mesolithic life.

<u>Definitions of 'site'</u>

Each of these approaches has affected the ways in which we consider the Mesolithic 'site'. Having ranged from a surface collection of two or more artefacts in close association, an aggregate of at least five artefacts having a spatial midpoint that occurs inside a spatial quadrant, any area characterised by a contiguous and continuous scatter of artefacts, or as a spatially discrete surface scatter according to Schofield's (2006) work, the 'site' has been opened to a wide amount of interpretations since Clark's beginnings in the 1930s. Therefore, Schofield (2006) takes the approach of describing surface distributions distinguished by a higher density of material in contrast to low density 'background noise'. "To understand what the distribution [of sites] means, however, one must understand the behaviour responsible for generating patterns of human activity as well as the various post-depositional processes which obscure any order which may previously have been apparent within a distribution" (Schofield 1991, 3). Also, in areas where there are low density scatters of artefacts but no high concentration 'sites', occupation should not be discounted only because denser patches have not yet been located. Therefore, he forms a strong distinction between a ‘site’ and a ‘settlement’ and argues that they should not be used synonymously (Schofield 1991, 3-5). While to McFadyen a Mesolithic site is less about a rigorous spatial boundary, and she more loosely defines them as assemblages or concentrations of worked flint objects that have been found in the ground (McFadyen 2007, 120), what she really accomplishes is a sense of how the site expresses the relationship people formed with each other and the world around them and this, in turn, created their sense of individual identity and belonging. The deposition, intentional or careless of material within a continuous landscape marked who the subjects were within this world. The composition of artefact scatters, then create networks of practice over the landscape, an idea substantiated by Conneller’s (2005) work which points to the network of objects, animals and people extending well beyond the deposited cluster of artefacts. Each of these approaches, therefore, points largely to the difficulties in drawing spatial boundaries around what was a diffuse and extensive inhabitation of the Mesolithic landscape in order to define the extent of an archaeological site. How, then, are we to break into this network to frame studies and create high resolution data sets without imposing artificial boundaries which do not reflect the nature of the Mesolithic formation and deposition of material culture?

Environmental Tradition

In keeping with the long and rigorous history of ecological approaches to the Mesolithic, there has been a profusion of new approaches to this type of data, attempting to better integrate people into the interpretations of these sets of information and to eradicate any lasting determinist critique of ecological approaches. Milner (2003) and Warren (2005), Sturt (2006), Reide et al (2007) and Taylor (2007) are all part of Clark’s legacy, in their work drawing on the nature of the human-environment interaction during this period, each equally pulling out aspects of this rich and highly nuanced inheritance of Mesolithic ecological research.

Sturt (2006) approaches the human-environment interaction through the use of Lefbvre’s rhythmanalysis and the language of harmonics to express the multiple sources and scales of data which together form our understanding of human perception and the palaeoenvironment. These sources and scales will be discussed further below, but in his musical analogy, Sturt underscores the cumulative impact of different types of concurrent or overlapping environmental change in correspondence with cultural change. This work critically expands our understanding of the impact of ecology on people's lives beyond a static relationship in which the environment at a single moment influences those within it to a comprehension of process; the ways in which patterns of change are at the root of our interaction with the world. This pushes forward the ideas of process within an environmental approach, looking at dynamism within the micro-scale approach.

Felix Reide (2005) has re-examined our understandings of how prehistoric people survived in inhospitable habitats. These environments have previously been considered uninhabitable by Mesolithic communities due to extreme temperatures and lack of resource availability. Reide et al's (2007) work has forced a re-envisioning of how quickly people may have responded to the rates of change, underscoring the attachment people have to a landscape which extends beyond the tools which they may find there to easily support life. Jim Leary (2009) has similarly studied community response to environmental change. By demonstrating the resilience and adaptability of people in the face of environmental change, they have challenged conventions on the immediacy and duration of human reaction to ecological impulse. These ideas shatter any critique of environmental determinism, underscoring that the inhabitants of these environments were perhaps reacting directly counter to the ecological stimulus. The human-environment relationship is shown to be much more complex than originally conceived by Clark (1932).

Barry Taylor (2007) has described how the palaeoenvironmental work carried out in the area provides a record of a rapidly changing wetland environment, with the encroachment of reed swamp and fen gradually across the Vale of Pickering in Northern England. "The detailed nature of the work that has been carried out in this area shows that the environment is more than simply a backdrop to human activity and demonstrates the dynamic nature of human-environment interaction at a landscape scale and over both short and long term periods" (Taylor 2009, 25). Beyond proving a human-environment interaction much more involved than a determinist paradigm, this work begins to look at how environmental change affected people's understanding of their world. Much as McFadyen's (2007) work explores how lithic remains indicate how Mesolithic people themselves conceived of the space around them, Taylor's (2007) work, operating on the micro- to local landscape-scale, studies the implications of environment parameters in this relationship.

These new dimensions of ecological research open such a wide variety of data sources and theoretical inputs. They promote questions as to the nature of this human-environment relationship across different scales of interaction, concurrent with our questions on the spatial extent of the Mesolithic site, and across different rates and characters of environmental change or stability. Each of these approaches applies the same data sources, but builds interpretations far beyond the initial one-to-one model of Clark's (1932) interpretation and draws on the strengths of the environmental specialisms he first promoted through his multi-disciplinary efforts.

The Mesolithic in reference to the Neolithic

The Mesolithic has, since its first definitions, been characterised in opposition to the Palaeolithic and Neolithic. However, the nature of the transitions between these periods is only now being explored in any greater depth. We have only very recently questioned what it means to say that culture was changing from one era to the next, and specifically what this meant for the people living during this period of transition. Further, the heterogeneity in the chronology of the Mesolithic to Neolithic transition and in the character of both periods throughout the southern North Sea basin, adds complexity to using this as a closing time stamp. This shift, consequently, has been especially targeted for further research to add better temporal definition to the remaining use of Clark's initial application of the Neolithic as the ending point of this time period, whereas the beginning of the Holocene was determined to have defined the start. Because the Neolithic provides the closing mark for the Mesolithic period, despite the deleterious impacts of this demarcation, no discussion of the Mesolithic can now be complete without reference to the transition into the Neolithic. Nicky Milner's (2003) and Graeme Warren's (2005) work on this Mesolithic to Neolithic transition has also further opened debate about the nature of the relationship between people and specifically the coastal environment. As one of the key components of transition, as argued by, Warren (2005) and Milner (2003), was a shift away from a maritime identity, these work call into question the understanding of Mesolithic communities as having had maritime identities, one of the key questions in Mesolithic research today (North Sea Prehistory Framework (Cohen et al 2009), Maritime

Research Framework (Adams et al 2011)). This is a critical component in creating the Mesolithic we choose to study today; understanding how people related to the maritime environment, especially dynamic during this period, as discussed in Chapter Three, during the Mesolithic as opposed to how they did so later as it influences the degree of their interaction with ecological change.

Warren (2005) argues that the Neolithic was the period in which people who had been defined by their knowledge of the sea ceased to exist, in which people became defined by other activities. Milner et al (2004) have countered that the stable isotope data, upon which the argument for a rapidly reduced dependence on the coastal environment has been based, has been biased by the sampling distribution employed. The initial stable isotope results from Tauber's 1981 publication, supporting the abrupt shift, within 100 years, from marine to terrestrial, were at first denounced as having encompassed neither a sufficiently large sample size nor geographical extent. However, further data from Denmark, Britain and France bore out his hypothesis, leading to the mainstream adoption of this theory. Milner et al (2003) have shown that the stable isotope data are not supported by archaeological evidence of shell middens, fish bones and fishing paraphernalia artefacts. To evidence this, she cites the Danish Early Neolithic TRB culture, which has indications of post-Ertebølle fishing practices. "Neolithic shell mounds of substantial thickness and extent, often stratified above Ertebølle shell layers, are present at Norsminde, Bjørnsholm and Visborg, the latter two being amongst the biggest shell mounds in Denmark" (Milner 2003, 11).

As Milner et al (2003) acknowledge, several authors have suggested that Neolithic sites containing fishing-related artefacts are likely task-specific camps for coastal-resource exploitations, but that the main settlements were located inland (Bailey 1982, Rowley-Conwy 1983). However, they counter that the inland sites should show evidence of the resources collected at the coast having been transported for use inland (Milner et al 2003, 11). Richards (2003) and Thomas (2003) have proposed that the shift from marine resources to terrestrial resources was not merely due to the novelty of an agrarian diet, but was an active and symbolic rejection of marine and coastal food sources. However, Milner et al (2003) answer this argument by offering the possibility that the early Neolithic samples are skewed in preference of higher status burials which would indicate preferential access to the new agricultural foods. Therefore, they suggest that while stable isotope data are a "valuable additional tool in the interpretation of ancient diets… they are not a panacea or substitute for other sources of information" (Milner et al 2003, 11). "We agree that the available isotope record indicates a consistent tendency towards a more dominant terrestrial signal in the diets of Neolithic individuals compared to their Mesolithic predecessors. However, we do not believe the evidence can be used to demonstrate a change as extreme or rapid as has been claimed, or to exclude the consumption of marine or terrestrial foods by Neolithic individuals, let alone whole populations" (Milner et al 2003, 18).

Milner et al (2003) end their argument strongly, stating, "As long as we continue to believe that the Neolithic revolution was the defining moment in the origin of European civilisation, we will be tempted to find evidence in support of a Mesolithic–Neolithic transition that is short and sharp and that emphasises the differences on either side of the boundary" (Milner et al 2003, 18). This is further indication of the risk of identifying time-periods solely in relationship to those on either side, as discussed above. While many archaeologists hold that the basis of our studies is difference, the ability to discern we must be sure that the scale and perspective used do not create a false pattern which inhibits rather than aids interpretation. Difference is, perhaps, more easily proven than similarity and so the effect of variations must be equally considered; is the scale of the change significant enough to alter people's perception of a situation? As Warren points out, "all too often in considering the transition to agriculture in north-west Europe, our thinking and writing fall into binary oppositions: Mesolithic or Neolithic; hunter-gatherer or farmer" (Warren 2007, 324). In employing spatially and temporally diffuse borders and analytical scales, these false binary distinctions are avoided. The Mesolithic in many ways seamlessly gives way to the Neolithic, as the Palaeolithic once gave way to the Mesolithic. While these shifts are occasionally sharply distinguished, they are equally often subtler, more transgressive.

Possibly the largest concern in interpreting the rate of adoption of Neolithic culture and the reduction of coastal habitation and maritime resource exploitation is the ability to date material absolutely versus relatively. Dates for the cultural shift to the Neolithic are often generated from wood and charcoal associated with artefacts attributed to Neolithic culture and technology or from cereal grains and pollen indicating clearance of vegetation and the implementation of agricultural practices (Tauber 1972, Williams 1989, Gkiasta 2003, Crombé 2004, Whittle 2007). The spatial distribution and the resolution of these data come into critique as these dates can often be sparse and the databases used to generate interpretations can be incomplete (Crombé 2004). The diffusion between the new use of Neolithic practices and residual Mesolithic culture is also a complication as pollen from cereal cultivation is found in association with Mesolithic artefacts leading to confusion over interpretations (Williams 1989, 518). Therefore, the ability to determine absolute dates in association with established relative chronologies has led to the argument for a more "flexible relationship between material goods, food resources and subsistence base [and] challenges the usefulness of classificatory models such as the Mesolithic/Neolithic scheme" (Williams 1989, 519). This argument re-emphasises the influence of chronological frameworks on the interpretations of prehistoric society. "Increased radiocarbon dates… allow exceptional refinement of the chronologies of the transitional period, suggesting a framework in which we can try to understand the scales of the processes involved for communities" (Warren 2007, 318). As Gearey similarly argues, a refined record for chronology of environmental parameters is necessary for an accurate correlation with archaeological events (Gearey 2009, 1486).

Importantly, to support the argument for an active coastal rejection occurring within a hundred, or even a few hundred years, the accurate dating of this transition would be vital in terms of locating the coast-line. As the location of the coast and the inland extent of the coastal zone have been shown to be fluid during this time period, without accurate dates, the occupation or disuse of this zone cannot be interpreted. Too, the margin of error in models of coastline deformation, as evidenced by the degree of difference between the current leading models, must be examined before a paradigm for coastline-abandonment can be substantiated. This will be discussed in Chapter Three, but as can be seen from Figure 5, the differences between predictions of early Holocene palaeogeography are substantial. Therefore, an argument for the sudden abandonment of the coastal zone in the transition from Mesolithic to Neolithic which does not take this level uncertainty into account, can be seen as untenable; if we cannot establish an accurate position for the coastline on a macro-scale, then we cannot fully demonstrate that people moved away from it.

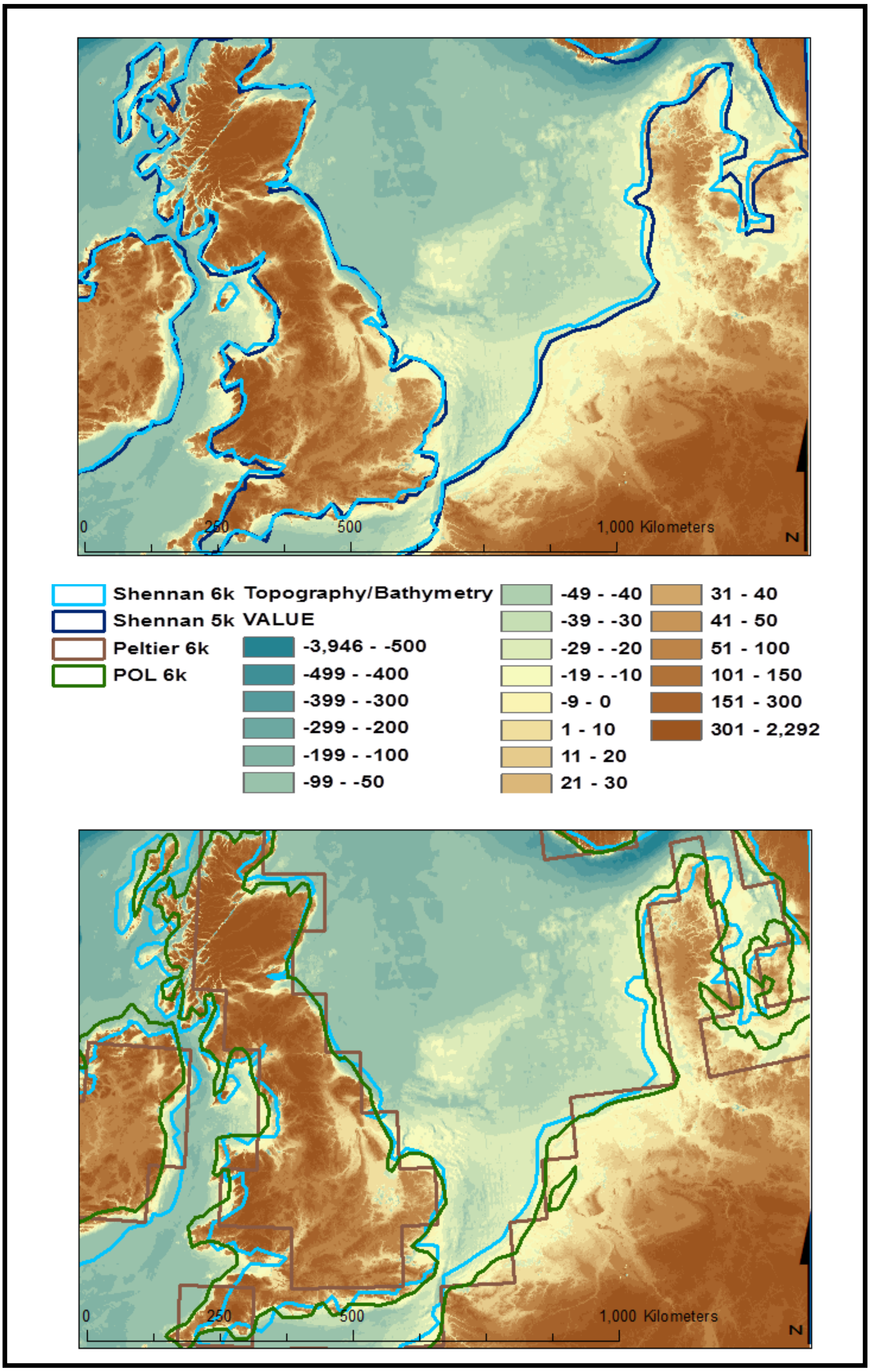

Figure 5. *Maps illustrating the uncertainty in predictions of local coastlines during Mesolithic to Neolithic transition. A) Showing the change in coastline morphology from 6,000BP to 5,000BP. Coastline limits following from Shennan (2000) on GEBCO bathymetry. B) Showing the differences between Shennan's (2000) RSL model and Peltier's (2004) GIA model and the POL GIA model of coastline morphology at 6,000BP.*

The idea of the reduction in the primacy of maritime resources and coastal habitation from the Mesolithic to the Neolithic is important in understanding what it meant to be a person in the Mesolithic as opposed to a person either before or after this period. This research emphasises that we have moved away from researching this period exclusively through lithics or through the environment, and have begun to deeply question an integrated picture of all available evidence to construct a fuller story of who people were during this period. However, it also highlights our continued gravitation towards using the Neolithic as our only closing indicator for building a chronology of the Mesolithic. The application of an ecologically signalled beginning appears to have reduced a similar level of interest or research into the equally complex Palaeolithic to Mesolithic transition.

Today and this thesis

We are now left with a wealth of prior data on the material culture and ecological conditions created and experienced during the Mesolithic in North West Europe, and with a theoretical tool kit to ask more probing, more complex questions of these data sets. The newest approaches to this material have highlighted the continued conflict over the appropriate scale and resolution of research into the Mesolithic. Is the contained, micro-scale approach, Clark's total archaeology truly the best and most rigorous means of interrogating prehistoric data from this period? Is it possible to define the spatial extent of a site without impressing false boundaries on a continuous landscape? Can we create meaningful interpretations from more diffuse data across a wider landscape and how far should this landscape extend through space? Further, how do we define the nature of the relationship between people and their environments? What does this relationship have to offer our constantly refined and updated definitions of what it meant to be a person in the Mesolithic? Does this improve how we conceptualize the period as its own unique entity and how we, therefore, frame future research?

These questions each engender a number of conceptual and scalar entanglements. We are no longer willing, as Mesolithic archaeologists, to rip our research apart at lithic approaches and ecological research, at micro-scale or macro, site or landscape. We recognise through the history and development of our discipline that these are irrevocably integrated, each a piece of the other. However, research still needs to be handled in a manageable, practical way. Specialist studies are, as Clark first argued, essential but we need to now take advantage of this work to unite them to practically create the better, more fully incorporated story of the Mesolithic to which we aspire. The progression of Mesolithic archaeology shows a definite grounding in practice; how then are we to structure research into these entanglements?

Figure 6. *Tape Measure, tangled up, close up* (Steve Lewis)

Symmetrical Archaeology

Concurrent to the development of the newest, post-post-processual questions in Mesolithic archaeology, the ideas surrounding symmetrical approach to archaeological information were undergoing resurgence and refinement. Symmetrical archaeology, due the lack of its prior application to archaeological practice, can be critiqued as a ‘theorist’s theory’. This dissertation, however, argues that it provides an answer to the question posed above as to how to handle the essentially entangled data sources, scales and resolutions we are faced with in Mesolithic archaeology. It is here proposed that the principles of this archaeological discipline are supported and, in fact, enhanced by applying the tenets of a symmetrical organisation of the disparate, tangled and interdisciplinary datasets which comprise this study.

Symmetrical archaeology is an epistemological and ethical principle which encompasses the concept of approaching both sides of a traditionally conceived Cartesian dualism concurrently, without privileging one over the other, and through acknowledging inherent intertwining (Shanks 2007). This theory was developed to answer the subject/object debate as discussed above. A symmetrical approach encourages the examination of the impact of both subjects and objects and how they iteratively exert influence over each other. It is "the culmination of effort in archaeology to undercut… dualities [such as] past/present, people/things, biology/culture, individual/society" (Shanks 2007) and articulates "mixtures, imbroglios [and] hybrids" (Shanks 2007).

Jones (2002) has used arguments from Wylie (1993) and Barrett (1990) to support the use of actor-network-theory in the creation of networks between theory and data. "Tacking back and forth between theory and evidence… allows us to follow a series of strands… to create something like a web of meaning. This process involves drawing on interpretations made at a general level, and following through the effect those interpretations have on the conceptualisations of the evidence at the more particular level" (Jones 2002, 25). In doing this, he argues that the theory and data become inextricably linked and weaker links in the network are supported. This is equally accomplished by applying a methodology of symmetrical archaeology in which there is no compulsion to begin with a definition of the end points (macro/micro, subject/object, nature/culture), as these can be addressed through the entanglements between them. Gamble (2001, 2007), too, uses the analogy of tacking as a means of strengthening inferences, moving between individuals, actions, groups and regions to compensate for variation in the resolution of our data sets. "Symmetry refers to an analytical levelling of these variable entities… [and] entails a denial of an assumed privilege within an oversimplified duality" (Witmore 2007). Symmetrical archaeology undercuts the discrete nature of end points in Cartesian dualisms and reunites them as actor-network-theory has for the disconnected nature of etiolated actors; it allows us to tack between data points and data sets.

Vital to Mesolithic archaeology's current aim to reintegrate nature (environmental data) with culture (archaeological data) is the reconfiguration of the subject/object dualism through use of the principles of a symmetrical archaeology. This allows us to move away from looking at prehistoric archaeology with an artificial dualism where "within one temporal box inhabiting the Mesolithic are hunter-gatherers, in another settling down in the

Neolithic are agriculturalists – humans of nature on the one side and humans of culture on the other" (Witmore 2007). Robert Van der Noort (2006) has argued for the interpretations of hybridity in Mesolithic communities; people of "natureandculture" dwelling within their environments. A symmetrical approach enables this model.

"Symmetrical archaeology centres itself upon the equitable study of the discipline's defining ingredients... [it] removes the reliance upon multiplying epistemological settlements that fragment the discipline" (Webmoor 2007). Symmetry in this study is offered as a means of uniting both the multiplicity of scales as well as the fundamental 'ingredients' of Mesolithic Archaeology: material culture, environmental parameters and questions of culture and society. In this, it is well-matched to and amplifies the goals of the discipline of Mesolithic Archaeology. It promotes an interdisciplinary integration of material from different scales with a balanced subject-object approach. "Symmetrical archaeology does not reclaim a unified archaeology; rather it simply conjures an image of occasions around which common ground might be formed" (Witmore 2007). By so drawing together not only different disciplines, but past research with present and planned studies, Webmoor (2007) argues that "a symmetrical archaeology [overcomes] an 'academic amnesia' with regard to previous scholarship". It does not present a scenario, as seen in the shift from processual to post-processual archaeology, in which one source of data, historically developed, must be abandoned in order to accomplish the goals of a new theoretical school. Instead, it seeks an improved balance between extant and developing data types. This is elemental to the two-step approach seen in Mesolithic archaeological studies, using previously established environmental or lithic sequences to create new interpretations of culture and society in middle prehistory. By not relegating past research, a symmetrical approach can further unite the disparate fields of research which must be conjoined to improve interpretations of life in the Mesolithic.

Finally, "a symmetrical archaeology understands how human beings live within the world in terms of mixtures and entanglements" (Witmore 2007). The Mesolithic was a world of mixtures and entanglements as is the study of this period. Particularly in the forming southern North Sea, identity, perception, culture and nature were entwined with the dynamic environment which was changing at a rate for which there is no modern analogy. The epistemology of Mesolithic studies is equally comprised of intertwined concepts and scales from chronological and spatial boundaries to the analysis of proxy data. A symmetrical methodology sustains studies which neither privilege a single scale of research nor support the disentanglement of Cartesian dualisms. Thereby, this is the best suited approach to discussions of Mesolithic coastal community perception of environmental change in the southern North Sea region.

Using a symmetrical methodology provides a workable answer as to how we can handle our entangled data sources and scales. However, how then do we break into the continuum of information which this presents in order to address the nature of human-environment relationships, the scale at which we might best research this question and the implications any answers may have for our conceptualizations of the Mesolithic as a whole?

Perception

Exploring the ideas of perception of the environment gives us an in-road, allowing us to follow a tack back and forth between people and their surroundings and also between the data we can access today and the people dwelling in the Mesolithic landscape. What we have seen to be important about the new questions we are asking in Mesolithic archaeology and the use of symmetry as a methodology is that it insists that we don't artificially split things up, we do not draw a line between where a person ends and his surroundings begin, they are extensions of each other. The idea of perception allows us to get into the middle of this network; a person's environment comes into being as it is perceived by the subject, but he in turn comes into his essence and understanding of himself through the act of perceiving that which is around him. It is this action, the recursive process and dynamic engagement that will be most pertinent in the discussion of perception in this dissertation. In this way, perception offers a lens through which we can better visualise the Mesolithic as we now, after the many conceptual iterations discussed above, want to conceive of this period. This point of contact with the intricate net of data scales and sources puts Mesolithic people at the forefront of examination of each piece of material evidence we, as archaeologists, then examine. Instead of secondarily or tertiarily incorporating people into the materiality, using perception as our lens into Mesolithic data reverses this relationship, first questioning how people would have interacted with and incorporated these components into their existence.

The perception of environmental change has been studied through a range of different approaches; from how quickly something has to be altered for an individual or a community to note that it is different, to the nature of the action of perception, to the effect on the perceiver's reactions, to the effect this recognition has on the perceiver's identity (e.g. Ingold 2000, Heidegger 1971, Warren 2007 respectively). This dissertation will look specifically into how we conceive of the reciprocal relationship between the perceiver and how this impacts the nature of our interpretations. A component of the debate over the subject-object divide discussed above, the character of the relationship between a people and their surroundings, and the language used to express this can obfuscate our understandings of the impact of perception on the lives of Mesolithic communities. The different means of conceptualizing and expressing this relationship will, therefore, be discussed below in the context of better understanding how each level of interaction influences the degree to which the surrounding world can be interpreted to have impacted communities in the Mesolithic.

Character of Perceived Environment

The most separated paradigm of human-environment interaction denotes a separate object-world which is independent from subjects. While it provides the backdrop to human existence, it is a disentangled ground which is unmodified by human perception. This concept is sympathetic with a scientific, empirical point of view in which the quantification of ecological parameters is paramount and any effect of the past experience of the perceiver (scientist or Mesolithic individual or community) is discounted. By this definition, a tree falling in the woods does make a sound. This perspective divides nature from culture into a Cartesian Dualism. Dolwick (2008) in his discussions of the social, Witmore (2007), writing from the standpoint of Symmetrical Archaeology, and Van der Noort (2006) in writing about the interaction between prehistoric humans and uninhabited landscapes, both dispute this divide. They instead present the innate hybridity of people, arguing for models which support people-and-things, people of nature-and-culture together. Sahlins describes the idea of 'nature' as a purely social construct saying, "Nature is to culture as the constituted is to the constituting" (Sahlins 1976, 209). Along the same lines, Ingold articulates a 'nature' which can only exist external to human interaction; "The world can only be 'nature' for a being that does not inhabit it, yet only through inhabiting can the world be constituted in *relation* to a being, as its environment" (Ingold 2000, 41).

Should this world-view be adopted into our archaeological interpretations, environmental change would have no impact on the lives of Mesolithic people beyond simple resource acquisition and ecological stimulus. As argued above, this provides an insufficient level of theoretical maturity and discounts the greater role of the environment we can now substantiate in our research.

If we more freely allow for this recursive and entwined connection between people and nature, a second level of interactive relationship becomes available to our interpretations. The environment as described by both Ingold (2000 and 2003) and Evans (2003) is constructed by social interaction and human perception. In this model, people are not without agency, determined by the environment, but are influenced by it and in turn develop what they perceive. This relationship is intrinsic in Heidegger's understanding of dwelling within an environment; 'dwelling' fundamentally distinguishes environment from nature. In Heidegger's lexicon, dwelling is the engagement of thought and action within the human-environment interaction. It involves awareness of ourselves and of space which we construct through building in the environment. Thus, through action, we mould our space and it, consequently, shapes us (Heidegger 1971b, 323-324). It is in the idea of dwelling within the environment that the two major contributors to the concept of phenomenology differ in their definitions of subjects and objects. Heidegger contends that only humans 'dwell' in the world by creating a sense of an emotional, spiritual and physical home beyond resource acquisition (Heidegger 1971, 161). Merleau-Ponty (1962), however, attributes to animals, agency and includes them as privileged subjects in his framing of interactions between subjects and objects, subjects and the environment.

Ingold (2000) echoes Heidegger's ideas of dwelling and the active engagement of humans with their surroundings. "Awareness and activity are rooted in the engagement between persons and environment" (Ingold 2000, 5). However, he does not subscribe to the full extent of Heideggerian beliefs that objects only exist in the presence of subjects but instead promotes the significance of the interaction between humans and their environments. "Minds cannot subsist without bodies to house them, and bodies cannot subsist unless continually engaged in material and energetic exchanges with components of the environment"; they are dependent on both the biotic and abiotic aspects of the environment (Ingold 2000, 41). In Ingold's environment neither the subject nor the object is privileged, but the relationship between the two is vitalized. By subscribing to this level of hybridity between people and their surroundings, we can construe a sense of home and individual understanding of existing within the world which is dependent on environmental context. This, therefore, extends us beyond environmental determinism into an interpretation of people and experience within those parameters.

However, in order to add in a final dimension of process of relationship with a changing, not static, environment, an element of temporality must be incorporated, and it is the understanding of temporality which allows us to get at the idea of perception. Following Heidegger's indication that *active* engagement is fundamentally important, it can be argued that perception is based in process and dynamism, in the temporal dimension.

Gibson (1982) and Ingold (2000) both argue that perception is a mode of action; "looking, listening, touching and sniffing… [go] on when the perceptual systems are at work" (Ingold 2000, 166 and Gibson 1982, 397). The type of action, therefore, guides the type of perception. "Crucially, then, perception is a two-stage phenomenon: the first involves the receipt, by the individual human organism, of ephemeral and meaningless sense data; the second consists in the organisation of these data into collectively held and enduring representations" (Ingold 2000, 159).

The scale of this process of interaction is, too, important. Evans, in line with Ingold, promotes the "closest, most intimate, scale with the land surface that can be experienced under everyday practices of living" in his discourse on the impact of texture on perception of the environment (Evans 2003, 45). In this argument, textures are from both socially built structures and from 'natural', "soil… woodland, meadows and the pavements and tarmac of our urban village lives" (Evans 2003, 45). Though particularly it is the surface underfoot and particles in the air, as the closest physical contact we have with the land that supports both resource use and manipulates social expression, which Evans indicates as the most influential textures. These have meaning through both space and time (Evans 2003, 47). He points to the Mesolithic creation of coastal sites as intersections of both naturally and symbolically diverse surfaces as indications of prehistoric, pre-agricultural perception and exploitation of different textures. The changing environmental textures described in the following chapters, therefore, would have greatly impacted the perceptions Mesolithic people had of their world as they encountered them, over time and space, in the course of their daily actions. The ecological changes considered in throughout this thesis are, therefore, not a background context to life in the Mesolithic, but are closely engaged components of the human experience of this time period.

Nilsson builds again on the application of a human, biographical, driven scale, using Gidden's (1985) definition of a 'locale', "the setting of human-environment interaction, wherein not only physical geographical aspects are considered, but also social and mental meanings" (Nilsson 2003, 146). Furthering this, her discussion centres on the importance of not prioritizing the characterization of large-scale environmental dynamics, but also establishing the more individual-scale perceptions of seasonal patterns and the colour of the environment. While she approaches this material apologetically, questioning if such queries are "childish" (Nilsson 2004, 147), this can be combined with Evans' argument for the importance of texture for subsistence and social sustenance. We can examine the individual and community scale interactions with the environment through querying their understanding of surface texture underfoot, timing of the onset of new seasons, or the colour of the vegetation around them, in conjunction with our understanding of the macro and meso-scale patterns of environmental change throughout this period. In doing so, we can draw out the important epistemological scales to be applied in interpretations of Mesolithic coastal community perception of environmental change and the effects that this perception had on their lives. "The basic building block of environmental knowledge is the perception of the individual person… [but] the mechanisms for gathering, processing and acting on information are of a largely social and collective nature" (Bell and Walker 2005, 141).

This temporalised, inhabited and perceived environment is often connotated by the term 'landscape', emphasizing the role of the human subject. As Cosgrove notes, "landscape denotes the external world mediated through subjective human experience" (1985, 13). He continues that they represent "a way in which people have signified themselves and their world through their relationship with nature and through which they have underlined and communicated their own social role and that of others with respect to external nature" (Cosgrove 1985, 15). This relationship between humans and their surroundings is, therefore, a critical connotation of a 'landscape' in that it supports a relationship not merely between subject and object but also between subjects in the context of the object-world. In this way, a landscape provides a means of organising the "dynamic, interdependent relationships that people maintain with the physical, social, and cultural dimensions of their environments across space and over time" (Anschuetz 2001, 159).

Different authors use the term to highlight concepts of ecology, geomorphology and hydrology as well as technology, social organisation and cosmology (Anschuetz 2001, 158). It provides a paradigm which can connect divergent strains of data, ideas and patterns over space and time (Crumley and Marquardt 1990, Lekson 1996, Anschuetz 2001). The emphasis on a historicity of landscape is unique from discussions of 'environment' which are more often chronologically static. A landscape is not a record, but a recording; they "provoke memory, facilitate (or impede) action" (Bender 2002, s104). "Landscapes… make a mockery of the oppositions that we create between time (history) and space (geography) or between nature (science) and culture (anthropology)" (Bender 2002, s106).

To compound on the inclusion of a time dimension, Ingold introduced the 'task-scape' which he defines as the expression of the temporality of the landscape (Ingold 1993). He states, "human life is a process that involves the passage of time… this life-process is also the process of formation of the landscapes in which people have lived" (Ingold 1993, 152). The intersection of temporality and historicity with the activities of social beings, comprise the task-scape (Ingold 1993, 157). A task is "any practical operation, carried out by a skilled agent in an environment, as part of his or her normal business of life… tasks are the constitutive acts of dwelling" (Ingold 1993, 158). This expands Heidegger's argument for building being the process of dwelling, as discussed above, to introduce any active participation in the environment as part of being-in-the-world. The task-scape also accentuates the inter-subjective aspect of an environment; "the temporality of the task-scape is social, then, not because society provides an external frame against which particular tasks find independent measure, but because people, in the performance of their tasks, *also attend to each other"* (Ingold 1993, 159-160). Ingold continues to promote the taskscape by arguing that while a landscape is visual in focus, the taskscape is auditory in nature, thereby taking into account other sensory experiences of the environment. Though you can see a dog, you hear its actions; you hear it barking (Ingold 1993, 162).

Landscapes, therefore, connotate temporal interactions between humans and their surroundings, which have been recorded and can be, to some extent, reconstructed from the lithic remnants deposited by prehistoric communities. However, we, as researchers carry additional associations of this term which can be more sterile, missing the populated, textural elements of this temporal record, and which are based exclusively in a visualization exclusively of *land*. People in the Mesolithic southern North Sea basin were not perceiving land alone, but were simultaneously interacting with land, water, sky, cloud, vegetation... all the texture of the environment as registered through all senses.

The Seascape

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Figure 7a. *Ceci n'est pas une pipe* (Magritte 1929), Figure 7b. *The Seascape* (Brown 2009)

Magritte (1929) (Figure 7a) famously presented his drawing of a pipe, saying, "Ceci n'est pas une pipe" (this is not a pipe), reminding the viewer that it is an *image* of a pipe. This dissertation questions what our modern image of (land/sea/etc.)-scapes is and how this affects our subsequent interpretations of the Mesolithic coastal surroundings. It is important to transparently recognise the limitations, imposed on our interpretations, by our own experience of the world, our own relationships with the land, the sea, the sky, the texture of the environment as we develop conceptualisations of the Mesolithic. Archaeologists do not wrestle with these ideas alone; many artists equally work to evoke not only the separation we have from our subject matter, but also the difficulty in robustly uniting people with their surroundings in our expressions of the world. The resulting images of our impact on the world and its impact on us are useful in confronting our expectations of these relationships; they provide an additional lens through which we can re-examine our ideologies.

Figure 7b shows the image rendered by Sam Brown (2008) (http://explodingdog.com) who has spent the last ten years illustrating anonymously submitted subject lines. Responding to the submission, ‘The Seascape’, he has included a man in a boat, demonstrating a very human perspective, but the rest of the image is sterile, uninhabited and untextured. Archaeology, similarly has often conceived of the seascape as a barren, unbreachable surface, a liminal space better suited to mythology and ritual than daily interaction. I would believe that Gormley’s (1997) approach (Figure 8) showing people mixing and separating from the sea as part of the daily rhythm of tides, sinking and emerging from the sand and water, is perhaps more appropriate, and better suited to what we know of Mesolithic communities dependency on their understanding of and relationship with the coastal environment.

Figure 8. *Another Place* (Gormley 1997)

The sea has been incorporated into interpretations of prehistoric environments as a backdrop to land-based activities, untextured and unresponsive, even in discussions of marine resource exploitation (following from Phillips 2004, 371-372). If Evans is correct in his discussion of the importance of texture to the human experience of the environment, then the texture of the sea as opposed to land, and the texture of the intertidal expanse should not be discarded as beyond the scope of 'landscape' approaches. Sturt (2006) discusses the idea of depth below the surface of the sea to differentiate between activities on the sea as opposed to in the sea. He extends this idea inland, using Bender's (1993) discussion of the surface focused nature of landscape archaeology, to introduce the idea of depth below the land surface. Through this, the false dualism between land and sea can be undermined. In deconstructing this land-sea divide, techniques and concepts used in landscape archaeology can be applied to the different textures of the inter-tidal and the sea. From Magritte (1929), we should understand the limitations of a static, *visual* expression of an object, a landscape or a seascape. Richard Long's (1967) work (Figure 9), explores this in his piece *A Line Made by Walking, England* in which the process and sensory experience of carving his piece into the land is fundamental to his art; human interaction is crucial to his, and any, understanding of a landscape.

Figure 9. *A Line Made by Walking, England* (Long 1967)

Nyree Finlay (2004) has synthesized different 'scapes (landscapes, seascapes, taskscapes, &c.) in her coining of the term e-scape which expresses the active, multi-sensory, engaged experience of an environment. The e-scape demands more flexibility in approach to the Mesolithic by including each sensory perception, the temporality of the taskscape and incorporating Finlay's agenda of recognising the importance of emotional response to the environment and the role of animacy in Mesolithic relationship with their surroundings (Finlay 2004). Finlay's idea of emotional e-scapes includes interpretations of how the texture of the environment would have impacted Mesolithic communities' emotions (following from Evans (2003)), integrating both imaginative texts on this by prehistoric archaeologists (Spikins 2002 and Finlayson 1998) and works on the archaeologist's own experience of studying the Mesolithic (Mithen 2003 and Warren 1997). The incorporation of animacy broadens the attribution of agency to animals as well as people as she argues that personhood, in forager communities, is often expressed through animal guises (Finlay 2004, 5). This has equally been seen in Conneller's (2003) work on antler frontlets at Star Carr. In this way, Finlay applies the word e-scape to integrate the many 'scapes discussed in environmental prehistory, but also to evoke the impression of escaping "from the boundaries and constraints of established approaches" (Finlay 2004, 2).

Through the case study (Chapter 6) this dissertation will try to explore how we can interpret the breadth of sensory experience, the totality of Finlay's (2004) e-scape through an active engagement with the world, from the varied and often scarce archaeological and palaeoenvironmental records. Perception, in this way, allows us to integrate the data we can analyse on the changing Mesolithic environment with the people who lived within these landscapes and to interpret the lives of these people with a greater degree of richness and comprehension.

Temporal Scale of Perception

However, in order to use the idea of tacking back and forth between what we can establish about the changing early Holocene environment and the effect on a Mesolithic individual's or community's understanding of the world, we must first establish the temporal range over which shifts in their surroundings may have been comprehended and absorbed into conscious recognition. Ingold discusses temporal ranges of perception based on three rates of change (Ingold 2000). The biographical scale is change which occurs within the lifetime of the perceiver. This is based on an individual human's active engagement with the world in the course of every-day activities as the means of perception. This relates to the discussion above in reference to Heidegger's notion of dwelling in the world being constituted by the act of building. Ingold instead emphasizes the day-to-day activities of resource acquisition and actor-actor interactions as fundamental to dwelling, or active perception of the environment. This engagement therefore, operates on the scale of human life; change occurring in tens of years. The community scale of perception is passed down through story, myth and legend. This word-of-mouth transmission would have preserved an understanding of previous static environments and progression of change between generations. Environmental oscillations occurring up to ~200 years could have been preserved in community memory (Westley and Dix 2006, 15). Longer-scale change taking hundreds or thousands of years to permutate, would not likely have been perceived by Mesolithic coastal communities outside the realm of oral history. At this slow rate of change, impacts would not have been felt on a day-to-day or even year-to-year, but only between generations or longer.

The engagement of Mesolithic coastal communities with the dynamic coastal environment would have been fundamental to their understanding of the world and to their identity as individuals and communities (Van de Noort 2006, O'Sullivan 2007, Warren 2007). Warren introduces the sea as "the very stuff of life for Mesolithic populations" (Warren 2007). Through understanding these environments and how they perceived them, we can investigate how Mesolithic communities "constructed a sense of identity and belonging through their daily or seasonal, practical and knowledgeable relationships with… dynamic wet environments" (O'Sullivan 2007, 149). At the scale of daily subsistence-based practice, people dwelled in shifting coastal communities and made these their own through construction of cultural resources for both human-environment interactions and those between "people, places, objects, animals and times… always at the centre of people's lives" (O'Sullivan 2007, 150 and 158). In creating a theoretical framework in which the environment is not a passive backdrop, but an interactive, responsive actor, the additional mutability of the Mesolithic environment, as outlined above, would have created distinctive social identities based in the dynamics as understood and passed down from generation to generation (O'Sullivan 2007, 158). Perception of the historicity of the landscape, seascape, taskscape or e-scape, would have carried particular weight in the variability of the Mesolithic. "It was through the continual interaction with this fluid world… that people grew into social individuals. Human identity is not given or fixed but a continually revised result of improvisation within the world" (Warren 2007). As Warren says, without the dynamics of the environment, these communities would not have recognised themselves (Warren 2007).

It is through this constant revising of a sense of self within a dynamic relationship with the surrounding environment that we can justify that exploring the nature of perception allows us to create a framework which pulls together, seamlessly, people and their environments, and, therefore, the types of evidence that Mesolithic Archaeology has always explored; lithics and ecology. It expands beyond resource availability without denying its importance and gives us insight into the very nature of what it meant to be Mesolithic in the southern North Sea basin.

The Mesolithic as constructed by archaeologists since the 1850s has experienced a number of iterations, each of which has built on the last. Originating in sequencing of material culture, the lithic basis for research into this period has always been a strong and obviously important component. However, the hesitancy with which Lubbock (1865) and Evans (1872) first differentiated this period from the Palaeolithic and Neolithic, and since negated ideas about cultural degeneration, left lasting associations of tentativeness and amorphousness. The scope of data input and the focus on multidisciplinarity developed with Clark's infilling of this culture-historical approach with environmental data. Through his work, the Mesolithic took on a new shape, being bounded with the ecological start of the Holocene initiation, though left with a cultural conclusion with the ill-defined start of the Neolithic. Clark's total-archaeology approach established a micro-scale environmental methodology which fit seamlessly with the empirical approach taken by processual archaeology, in favour in the 1960s. Passing through the post-processual critique largely unchanged, it is only very recently that Mesolithic archaeology has been opened to a multiplicity of approaches considering the implication of a wide range of scales of data on individuals and communities in the Mesolithic. Despite the much more interpretive and conceptual approaches which have recently questioned the available data and promoted re-integration of specialist data sources first established by Clark in the 1930s, the Mesolithic is still left with some connotations of being Burkitt's (1932) dust-bin, into which any odd industry could be cast. There is a substantial need to revisit the means by which we organise these diverse data sets and consider carefully how we incorporate people into the materiality of the archaeological record. In this way, we can meaningfully recreate the Mesolithic we choose to study now, defining this period through the full spectrum of available data and striving for a mature understanding of what it meant to be a person living in the Mesolithic and overcoming the amorphous beginnings of this period.

It is argued here that a symmetrical approach to the organisation of data creates a framework which avoids privileging one source of information over the other. This system recognises that tools, industry, economy, and environmental parameters across many scales were each vital components of the Mesolithic experience and should given equal weight while creating a guiding conceptualisation of the essence of life in the southern North Sea landscape during the Mesolithic. The perceptions Mesolithic people had of their environments, based in the idea of an active, daily and recursive interaction with a textured landscape experienced through full sensory engagement, will be used as the thread by which we can tack between sources of archaeological evidence, keeping people at the centre of our interpretations as we evaluate how each input plays into our understandings of this period. In each stage of its history, Mesolithic archaeology has questioned the appropriate scale of approach and has challenged the extant definitions of an archaeological site. This, then, becomes the fundamental question tackled in the remainder of this thesis. How do we define each scale and what do they then have to offer a reconstructed conceptualization of the Mesolithic? Can we meaningfully integrate scales of research so that the whole becomes greater than the sum of its parts?

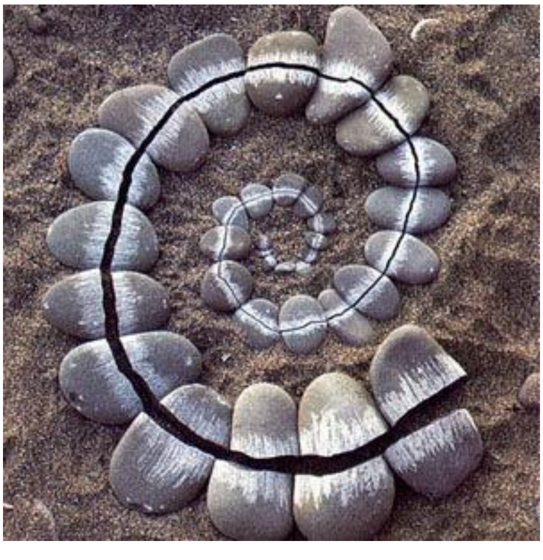


Figure 10. *Spiral* (Goldsworthy 2008)

Chapter Three: The Macro-Scale

This chapter will employ a macro-scale approach to studying the Mesolithic in the southern North Sea. Following on from the end of Chapter Two, this chapter will use perception as an avenue through which to gain entry into the entangled continuum of the Mesolithic. Specifically, this chapter explores the macro-patterns of environmental change during this time in the context of what people living around the southern North Sea basin would have been experiencing and actively engaging within their surroundings. The proxies by which we can now, to some extent, reconstruct these alterations will be considered to establish how we analyse the past environment. The interpretable parameters of the shifting macro-environment will then be considered in conjunction with the rate of change. If perception occurs on the temporal scales discussed in Chapter Two (following from Ingold 2000), the rate of change becomes particularly important to defining which alterations would have been significant to Mesolithic lives. Ice-retreat, isostasy, sea-level rise, vegetational regimes, and daily coastal rhythms such as tides, currents and weather, will be considered in terms of the degree to which they would have influence the relationship Mesolithic people had with their e-scapes. Beyond this, these macro-scale changes will be considered for their potential to indicate patterns in the dynamism of the Mesolithic environment, and thereby to promote profitable analytical groupings. It will be argued that these macro-scale changes in the environmental conditions can be applied to more organically define the spatial extent of the southern North Sea basin for the purposes of studying the Mesolithic in this region. With this lateral definition of the study area in hand, this chapter can then look at the macro-scale archaeology from across the basin and consider the implications for how we have constructed our generalisations of the Mesolithic for this region. This will draw on a comparison with the themes of the wider history and current goals for Mesolithic archaeology as established in Chapter Two to see if the macro-archaeological and environmental work for this region is sufficient for achieving our ambitions or requires further integration with meso- and micro-scale data and analysis to meaningfully recreate our conceptualisations.

Macro-scale Patterns of Environmental Change

Figure 11. *Cows on Beach* (Waite 2007)

Environmental change is a composite of many elements which constitute human experience of the world. Ecological shifts are especially influential for research into this time period, being bracketed, as it has since Clark's initial work (1932) by the onset of a new geological period, the Holocene. The effects of ice-retreat and rise of global water levels are, therefore, fundamental to the environmental context of this stage of prehistory. Discussions of environmental change in the Mesolithic of the southern North Sea are particularly easily dominated by the extensive and rapid sea-level change which formed this body. The rise in temperatures at the collapse of the Younger Dryas at 11,700BP (Walker 2009), caused a net increase in sea-level which formed the North Sea approximately to its current extent by 7,500BP. However, environmental change was not limited to sea-level rise; vegetation, water-quality, shore-line morphology, fauna, weather, winds, tides and current patterns were altered throughout the Mesolithic.

Neither did this change occur in a uniform progression from the Palaeolithic to the Neolithic, a commonly held generalization especially of ice-retreat and sea-level rise in this period. Environmental change during this period was dynamic; it occurred at varying, asynchronous rates which oscillated from positive to negative. As Gulliksen (1998, 250) notes:

> "Climate… changes over a period of time. In Greenland ice, the Younger Dryas-Holocene shifts in [biological parameters]… occurred on decadal timescales, but the Holocene temperature rise of 7 deg C…took place over 60 years."

Other parameters of this meshed environmental texture changed within days or over centuries. The perception of homogenized change perhaps reflects and certainly perpetuates the idea of the Mesolithic as a transitional era, the roots of which were discussed in Chapter Two. If the pattern of climate change began with the cold Younger Dryas and ended with warmer temperatures by the start of the Neolithic, began with a limited North Sea expanse and ended with its dominance of landscape, began with vegetation dissimilar from our own and ended with familiar ecosystems, then it is understandable that these changes should be generalized into a smooth progression and that, in the ecologically-dominated theories of Mesolithic archaeology, that the culture of this period should follow suit. However, the greater complexity and our much higher refinement of understanding will be used to explain how this is a misleading and false conceptualization of the environment at the time and of the period itself.

Proxies

A variety of evidence has been used since researchers first began to question the history of the environment. The recent past is replete with instrumental data directly measuring temperature, precipitation, sea-level, etc, but these records seldom exceed the last three hundred years. Historical records from diaries, annals, ship's logs, woodcuts, pictures, etc extend further back in time. The most widely used and furthest reaching in time-depth is the evidence from proxy records of environmental change. "The term 'proxy' is used to refer to any line of evidence that provides an indirect measure of former climates or environments, and can include material as diverse as pollen grains, insect remains, glacial sediments and tree rings" (Bell 2005, 17). As the whole ecosystem responds to the climate, individual organisms will show the signal of change once environmental thresholds have been crossed. By quantifying these reactions, past environmental parameters can be modelled, and by the application of several proxies, the palaeoenvironment can be reconstructed within acceptable error margins. The rates of change can be developed by modelling the temporal response of each indicator, or proxy source. "For assessment of the rates of climatic change, mulitproxy studies from high-resolution sequences with calendar chronologies are needed" (Gulliksen 1998, 250). The proxy data sources which will be used in developing an understanding of the Mesolithic palaeoenvironments in the southern North Sea basin are plant macrofossils, pollen, stratigraphy and lithology, diatoms, foraminifera.

Plant macrofossils include fruit, seeds, wood and other parts of plants including leaves, buds, scales and spines which are preserved in the anaerobic conditions of lake sediments and peat deposits. They are most frequently deposited close to the plant from which they derived. As such, they can provide information on local vegetation communities (following from Bell & Walker 2005, 23).

Pollen grains, conversely, are disseminated over wide areas, dispersed by wind, water, animals and insects. Therefore, the areas they indicate are more diffuse than macrofossils from the same plants. However, pollen grains are preserved in similar anaerobic environment. As the climatic requirements of different species of pollen can be quantified, multivariate statistical methods can be applied to reconstruct past environments based on modern plant-climate relationships (Bell & Walker 2005, 23 and Gulliksen 1998, 250). Further, Gearey (2009, 1478) has shown how Bayesian statistics can be applied to palynological (pollen-based) sequences to correlate them with cultural events as indicated by archaeological evidence. A complication in the dating and analysis of palynological evidence derives from the formation of peats and other sediments in which pollen grains are preserved. Variations in sediment accumulation rates and re-working by fluvial, biological and anthropogenic processes can obscure the relative chronology of pollen deposition and can complicate the construction of pollen sequences and palaeoenvironmental modelling (Gearey 2009, 1477).

The most commonly analysed sediment depositions for reconstruction of past environments are peat accumulations. Peat is formed in waterlogged localities where the breakdown of vegetal material is reduced by anaerobic conditions; the reduced oxygen allows for better preservation of organic remains. As well as preserving macrofossil and pollen evidence, the degree of humic material, colour and moisture content of peat layers can indicate the conditions of the water table at the time of deposition (following from Bell and Walker 2005, 32). Equally, alluvial, colluvial and marine sediments record changes in the energy of a wetland environment which is in turn indicative of shifts in sea-level, wind, currents and wave-patterns. Soil typologies have been heavily relied upon to reconstruct the rise and oscillations of the forming North Sea, one of the dominant macro-scale environmental changes explored in this chapter. Though, these proxy sources will become especially important in the meso and micro-scale analyses applied in the following chapters where they are used to illuminate the dynamic processes and rhythms of the Mesolithic environment in the southern North Sea.

Diatoms and foraminifera are also used to study sea-level and water quality shifts. Diatoms are unicellular algae living in ponds, lakes, estuaries and seas. Their sensitivity to acidity, oxygenation of the water column, mineral concentration, water temperature and salinity make them a valuable resource for water quality research and especially for studies of marine transgressions and regressions. Their durability in coastal sediment sequences adds to their utility in palaeoenvironmental reconstructions. Foraminifera are marine protozoans occupying aquatic habitats from salt marshes to blue-water ocean environments. As they are versatile and sensitive to changes in sea-level, water-quality and sea-ice cover, they can be used for reconstructions in several different environments and are very useful for coastal research (following from Bell and Walker 2005, 28-30).

Lag

Research into past climates, as reconstructed by indicator species, must take into account the lag in response time which each proxy will demonstrate, adding to the complex enmeshment of temporal scales involved in studying the Mesolithic environment. This lag will depend on the amount and the rate of climate change and the individual thresholds and sensitivities of different proxies (Gulliksen 1998, 250). "Terrestrial plants and animal respond directly to climatic change when large changes cross their tolerance thresholds.

However, organisms are not isolated like physical measurements but interact in an ecosystem where feedbacks apply according to the organisms' individual biology and their environmental and physiological tolerances (Birks 2000, 1390). Feedback within a system can be positive or negative, reinforcing the stimulus to change or mitigating it, depending on the interrelationships between components within an ecosystem (Bell and Walker 2005, 10). "After the initial rapid response at the start of the Holocene, changes occurred as biotic temperature thresholds were passed and immigration and ecosystem processes became influential" (Birks 2000, 1390). Following initial response to the beginning of the Holocene, "individualistic responses were expressed, leading to variable rates of change… linked to environmental and catchment developments and climatic thresholds" (Birks 2000, 1393). This is a crucial scalar entanglement in the discussion of early Holocene environmental change. The patterns and rates of change seen during this period were not synchronous throughout each ecological parameter; they followed unique rhythms and scales of change which created both positive and negative feedback loops at any one time in the chronology of the Mesolithic. Therefore, it needs to be recognised that the temporal scale of study will impact interpretations of the character of change as signalled by each proxy data source.

Ice-retreat

To address the aims of this chapter, then, the macro-temporal-scale environmental context leading into the Mesolithic period's ecological dynamism will be considered here. Chronologically, the Last Glacial Maximum (LGM) occurred between 30,000BP and 19,000BP (Lambeck 2002, 203). The progression from this last glacial period in North West Europe, called the Weichselian, to the present interglacial, the Holocene, was comprised of several climatic reversals, the last, largest and longest of which was the millennial scale Younger Dryas (Gulliksen 1998, 249). The signature for the Younger Dryas is most strongly apparent, lithostratigraphically and biostratigraphically, in southern Scandinavia (Lowe et al 1994), realising a high potential for the dating of the end of this reversal and a large relevance of the Younger Dryas reversal in the southern North Sea region. "The climatic change at the Holocene boundary is more abrupt, better defined, and of larger amplitude along the western seaboard of Europe than in most other areas (Lowe et al 1994)" (Gulliksen 1998, 249). Much work has been done, therefore, since the late 1990s (Gulliksen 1998, Birks 2000, Birks 2008) to pinpoint the transition from the

Younger Dryas to the Holocene. Most recently Walker (2009) has established this transition occurred at 11,700 cal yr b2k (calendar years before A.D. 2000). This date was achieved using the North Greenland Ice Core Project (NGRIP) core data and five auxiliary records including a core from the Eifel Maar Lakes, Germany, on the inland edge of the study area defined for this dissertation, and has a maximum counting error of 99 years (Walker 2009, 3).

Warming temperatures began with the end of the Last Glacial Maximum and led to early Holocene climate amelioration and the eventual climatic optimum at ~9000BP-4000BP (Bell and Walker 2005, 89). From 30k BP to 25k BP, North West Europe was dominated by a confluent ice-sheet, which separated into British and Fennoscandian extents (Figure 12) during the LGM from 24k BP to 19k BP (Bradwell 2008). The ice-sheet extents over this region have been highly contested, culminating recently in Bradwell's (2008) research using bathymetric data to prove confluence and to model subsequent separation along a north-south axis east of Shetland driven by sea-level rise.

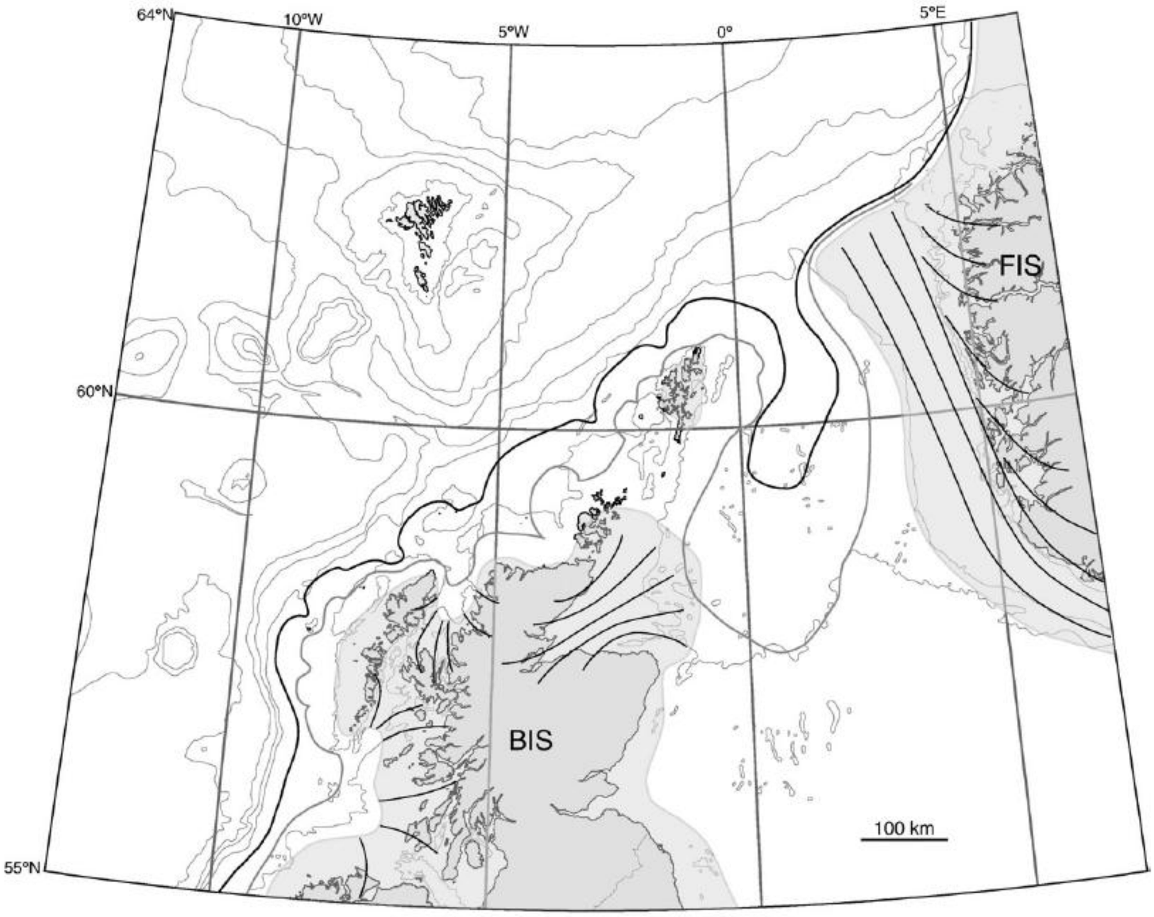


Figure 12. *Confluence and separation of British and Fennoscandian Ice sheets during LGM (from 25k BP to 19k BP. Three sequential stages of separation are shown: the black line indicates the Calving bay initiation of separation, the grey line indicates the well developed Calving Bay and dynamic ice-sheet separation and re-organisation, and the shaded fill indicates the separated British and Fennoscandian ice-sheets with a free central North Sea basin* (Bradwell 2008, 223).

Figure 13 shows the Peltier (2004), Proudman Oceanographic Laboratory (POL) and BritIce models for ice-sheet extent at the end of the LGM (19k BP) and subsequent retreat. The POL model is a Glacio-Isostatic Adjustment model based on 5 minute TerrainBase bathymetry a precursor to the ETOPO2 and updated NGDC topography data sets. The Peltier (2004) extents are derived from the ICE-5G (VM2) model of glacio-isostasy and surface altitude during the last ice-age. Resolution of the available data is, however, sampled at 1 degree, except for at 0ka and 21ka, at which data is available at 10 minute resolution. Therefore, the POL dataset is prioritized for the purposes of this study as the resolution of the Peltier (2004) model is too coarse for useful analysis.

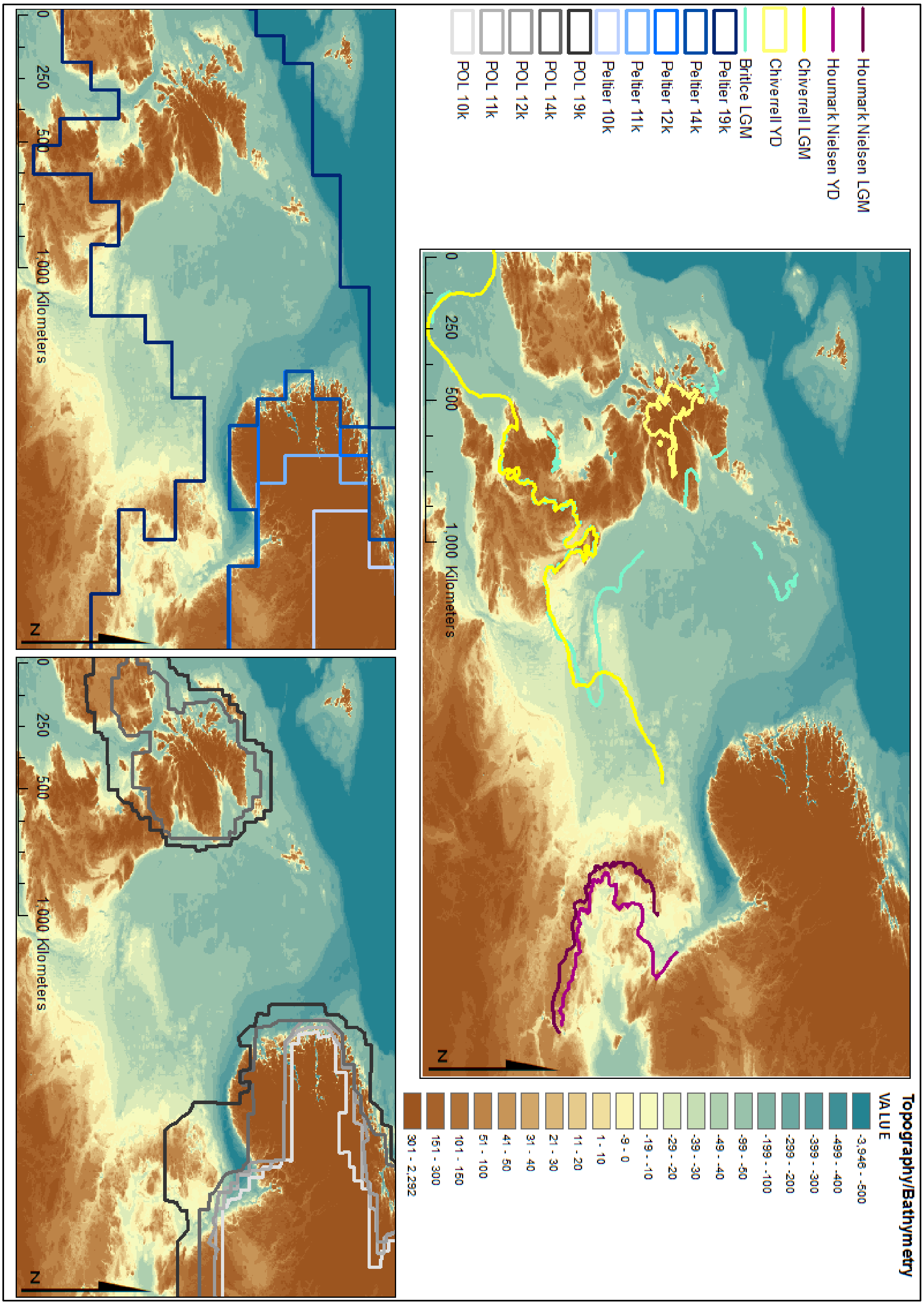


Figure 13. *Comparison between ice sheet models for LGM extent and subsequent retreat.*

Mean temperatures at the LGM were as low as 10 degrees C in July and -25 degrees C in January (Bell and Walker 2005, 72), and while regions further to the north were, by all models, under direct ice-cover, the southern North Sea basin resembled an arctic tundra (Bell and Walker 2005, 73). Warming trends from the end of the LGM was punctuated by oscillating warming and cooling periods (Figure 15). The present interglacial began at the 11,700 BP end to the Younger Dryas (Walker 2009). Mean surface-water warming rates of 1-2.8 degrees C per century were established along the western coast of Europe and in Britain (Bell and Walker 2005, 88).

Warmer temperatures led to global-scale deglaciation from 19,000BP. Thawing of the permafrost occurred over large areas; by 9,000BP large-scale ice cover had disappeared nearly entirely from western Europe (Peltier 2004). The results of this mass deglaciation surrounding the study area had two main impacts on relative sea-level throughout the southern North Sea basin leading up and continuing into the Mesolithic period. It led to isostatic shifts in land height, due to the reduction of the weight of the ice pressing on the land surface, and to global eustatic sea-level rise, due to the addition of melt-water into the world's water-ways. Isostatic change refers to alterations in the earth's crust where depressions in one locality will be compensated for by a rise elsewhere, where as eustatic rise is vertical elevation of the global sea-level (Bell and Walker 2005, 116). An isostatic lift of the coastal land surface mitigates the effects of eustatic rise, while a depression compounds it. Thus, relative sea-level rise is dependent on the degree of both components.

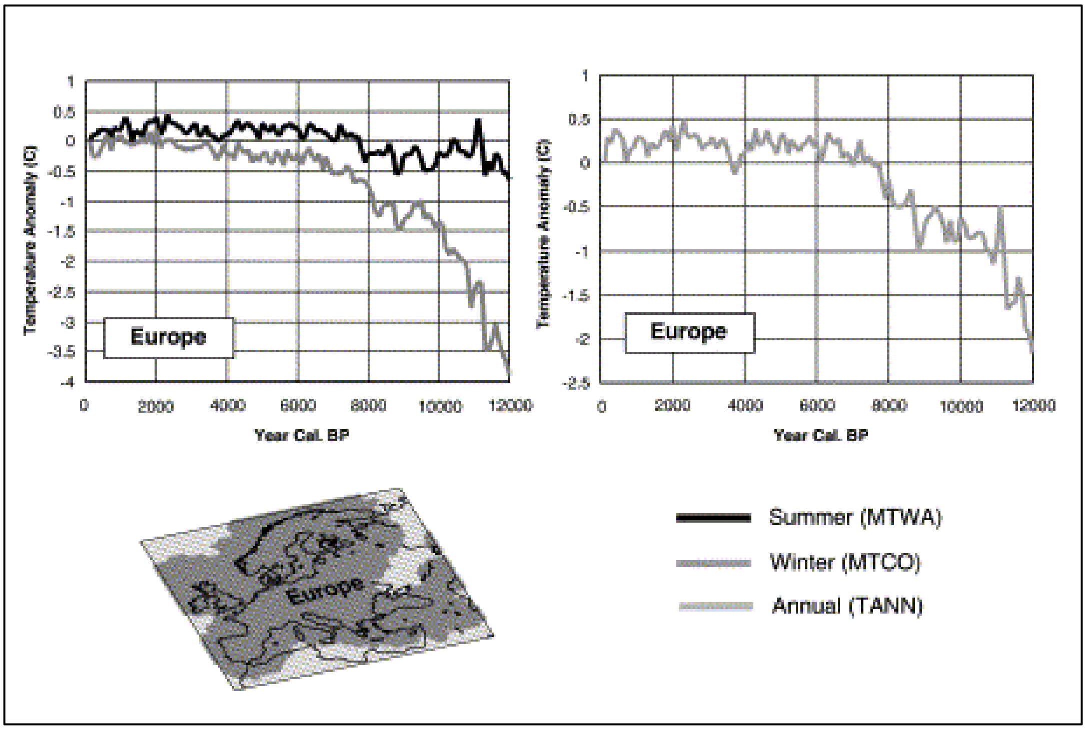


Figure 14. *Reconstructed area-average summer, winter and annual temperature for the Holocene in Europe derived from pollen data, showing the rapid increase in average temperature during the early Holocene* (Davis et al. 2003, 1709)

The rates of isostatic uplift in the southern extent of the North Sea basin, though diverse as will be discussed in the meso-scale analysis in Chapter Four, were minimal in comparison with both the Fennoscandian and northern British rise and, importantly in comparison with the eustatic sea-level rise during the Mesolithic. Therefore, eustatic sea-level curves will be predominantly relied upon to discuss the rate of change in the southern North Sea basin since the LGM. A summary of the isostatic component of Holocene sea-level rise is presented here to validate this decision.

Isostatic Movement

Figure 15a (Shennan 1987, 129) shows the relative sea-level curves from the North Sea drawn on a uniform scale. This is used to illustrate the homogeneity of reaction to sea-level change through the southern extent of this basin despite local differences in isostatic uplift. Figure 15b (Shennan 1987, 136) displays uplift and subsidence rates for the North Sea basin. Further north in this region, in the area formerly covered by the British and Fennoscandian ice-sheets (Shennan 1987, 2000; Bradwell 2008) (Figure 13) uplift was greater and diminished the effect of eustatic sea-level rise as can be seen in the relative sea-level curves of Figure 15a. It can be seen from Figures 12 and 13 that the spatial extent of this study was not directly impacted by large scale ice cover. The isostatic uplift in these regions has been less than in nearby, formerly ice-covered, regions. Thus, while the northern extent of Denmark begins to show the effect of this greater uplift, the majority of the southern North Sea basin has experienced uplift rates which are minor in comparison to the dramatic eustatic sea level rise. With a maximum estimated rate of 1.21m/1000years (1.21mm/year) (Shennan 1987, 136), even a conservative eustatic sea-level rise estimate of 12.5 mm per year (Behre 2007, 85), would dominate the isostatic component of sea-level rise by an order of magnitude.

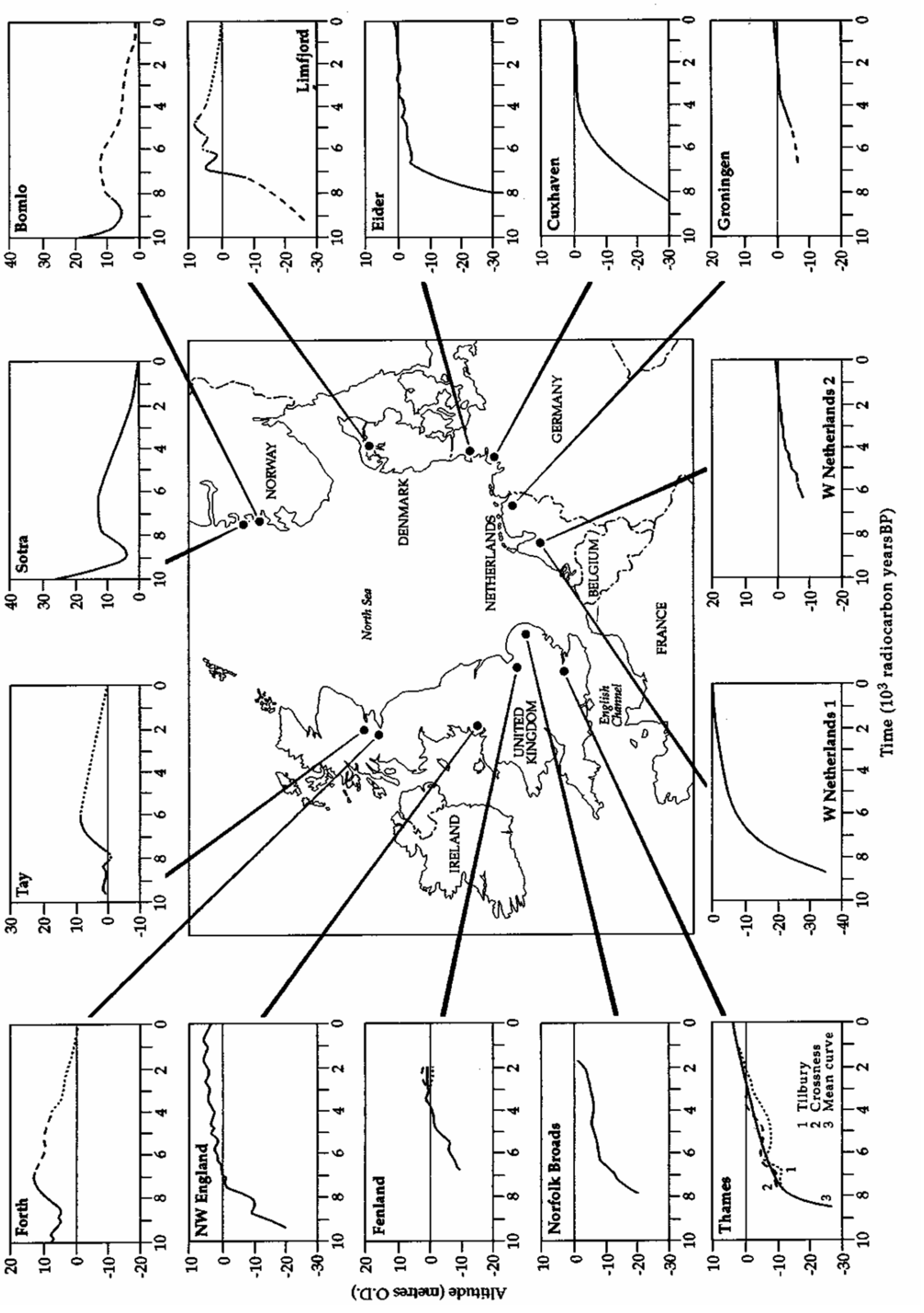


Figure 15 a. *Relative Sea Level curves around the southern North Sea basin* (Shennan 1987, 29)

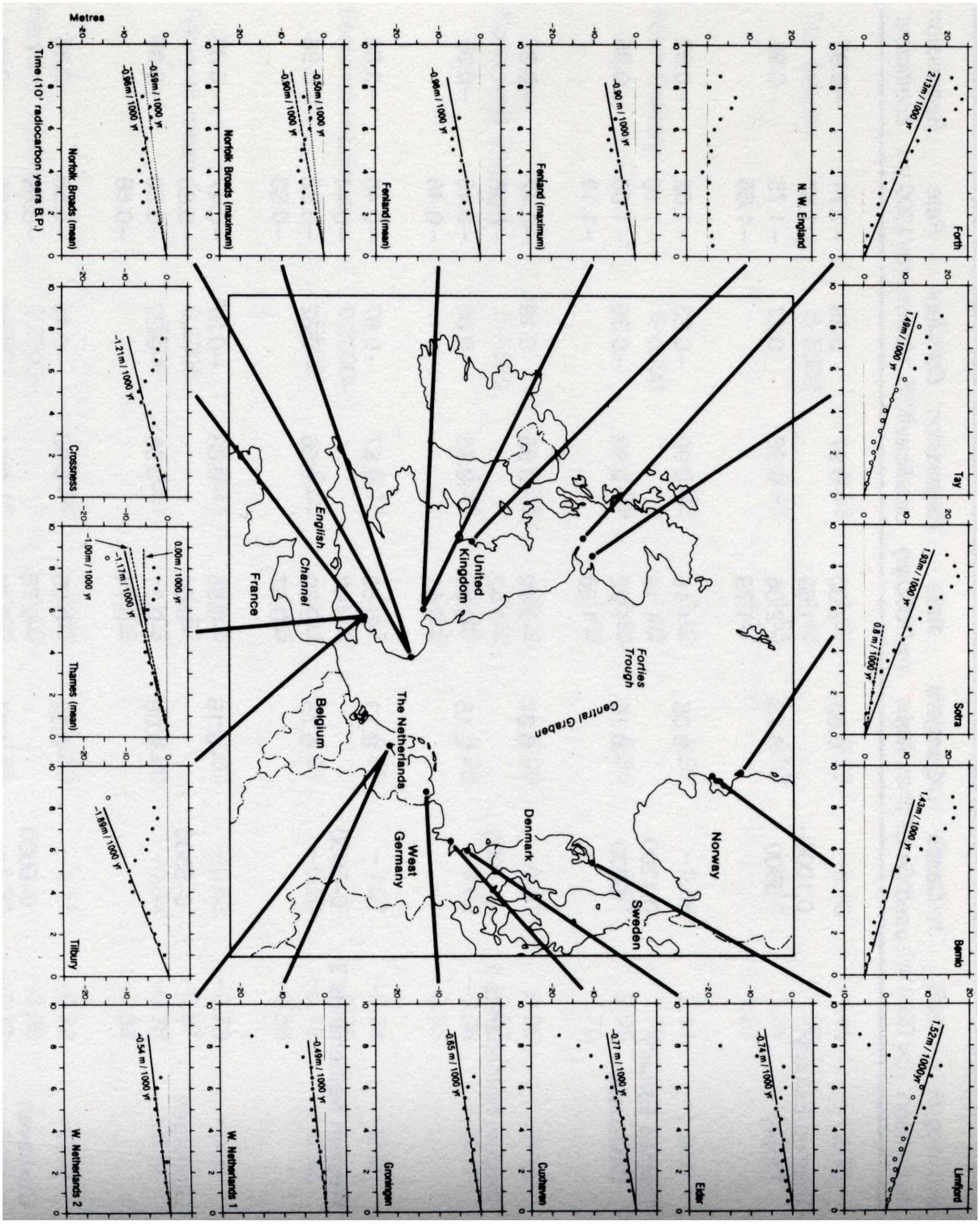


Figure 15 b. *Isostatic uplift rates for the southern North Sea basin* (Shennan 1987, 136)

Eustatic Sea-level Rise

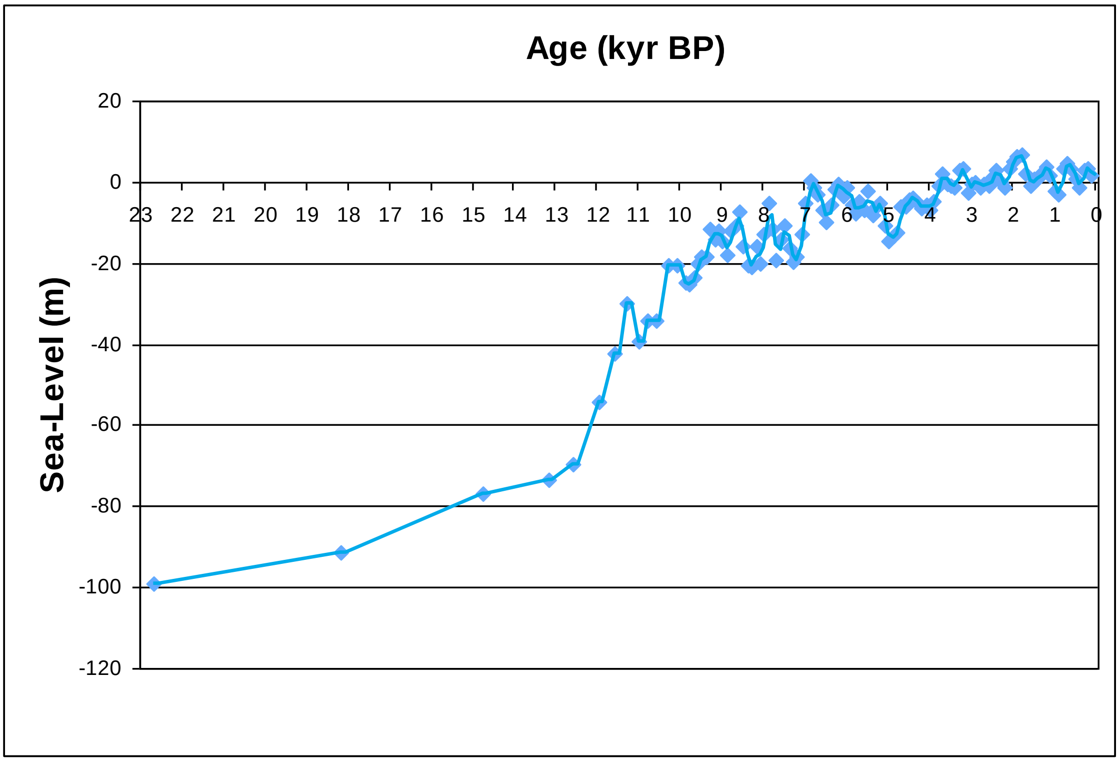


Figure 16. *Eustatic sea-level curve since LGM based on Rohling et al (2010)*

Global eustatic curves have often been based on coral reef data from Barbados (e.g. Mesolella 1969, Peltier 2006). This locality has the advantage of being a 'far-field-site', meaning that it is removed from centres of glacial activity which are most prone to isostatic uplift, has been demonstrably tectonically stable, and has a coral record dating back 20,000 years (Bell and Walker 2005, 116). New data from the Red Sea basin has now been correlated to the Barbadian data as a comparison of eustatic sea-level rise closer to Europe. This model takes advantage of the extreme sensitivity of the Red Sea water residence times to sea-level change, which is a result of the narrow (18 km) and shallow (137m) character of the Strait of Bab el Mandab, its only connection with open ocean (Siddall et al 2003, 853-854). Uplift rates in the Strait have been estimated at 0.44+/-0.022m kyr^-1 (Rohling 1999) and have been substantiated with evidence for a rate of 0.02m kyr^-1 (Siddall et al 2003), which are negligible in comparison with the confidence limits of the model of +/- 12m accuracy (Siddall et al 2003, 85 and 83). Below in Figure 17, are the comparisons between a Red Sea marine sediment core used to generate this model with the established coral reef data for the last 20,000 years showing a high degree of correlation, with deviances of only up to 5m, which is within the +/-12m confidence margins.

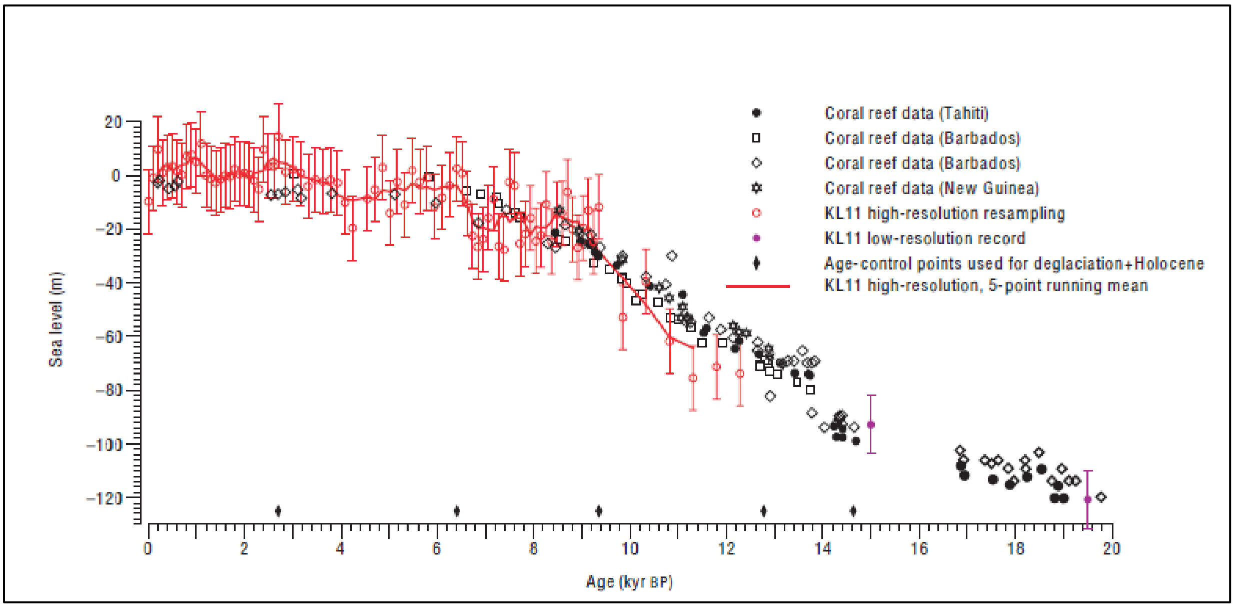


Figure 17. *Red-Sea and coral data sets for eustatic sea-level rise* (Siddall 2003, 854)

Figures 16 and 17, show the steep rise of eustatic sea-level over the last ~19,000 years. Acceleration of this rate of rise occurred at 19,000BP, 14,200BP and 11,300BP and sea level rise dramatically slowed at ~7,000BP (Siddall 2009, 69). Models based on the coral and Red Sea records show rates of sea-level rise up to 50mm/year in the last glacial cycle (Rohling et al 1999, 500). Compared to rates of change today as reported by the Intergovernmental Panel on Climate Change (IPCC) of a global average sea-level rise of 1.8 +/-0.5mm/year for the period from 1961-2003, the magnitude of this rate of change can be seen. A single 30 year generation would have seen a meter and a half of vertical sea-level rise if unmitigated by isostatic uplift. Figure 18, Vink's (2007) graph showing mean sea-level curves from the southern North Sea basin compared to predictions of eustatic sea-level rise shows how closely these are related throughout the study area. The rapid rates of sea-level rise were experienced across this basin, with a dramatic start at the end of the LGM, a continued high rate of rise through the start of the Holocene and a marked reduction around 7,000BP. The rate of Mesolithic sea-level change across the entirety of the study area was orders of magnitude greater than that which we are experiencing today.

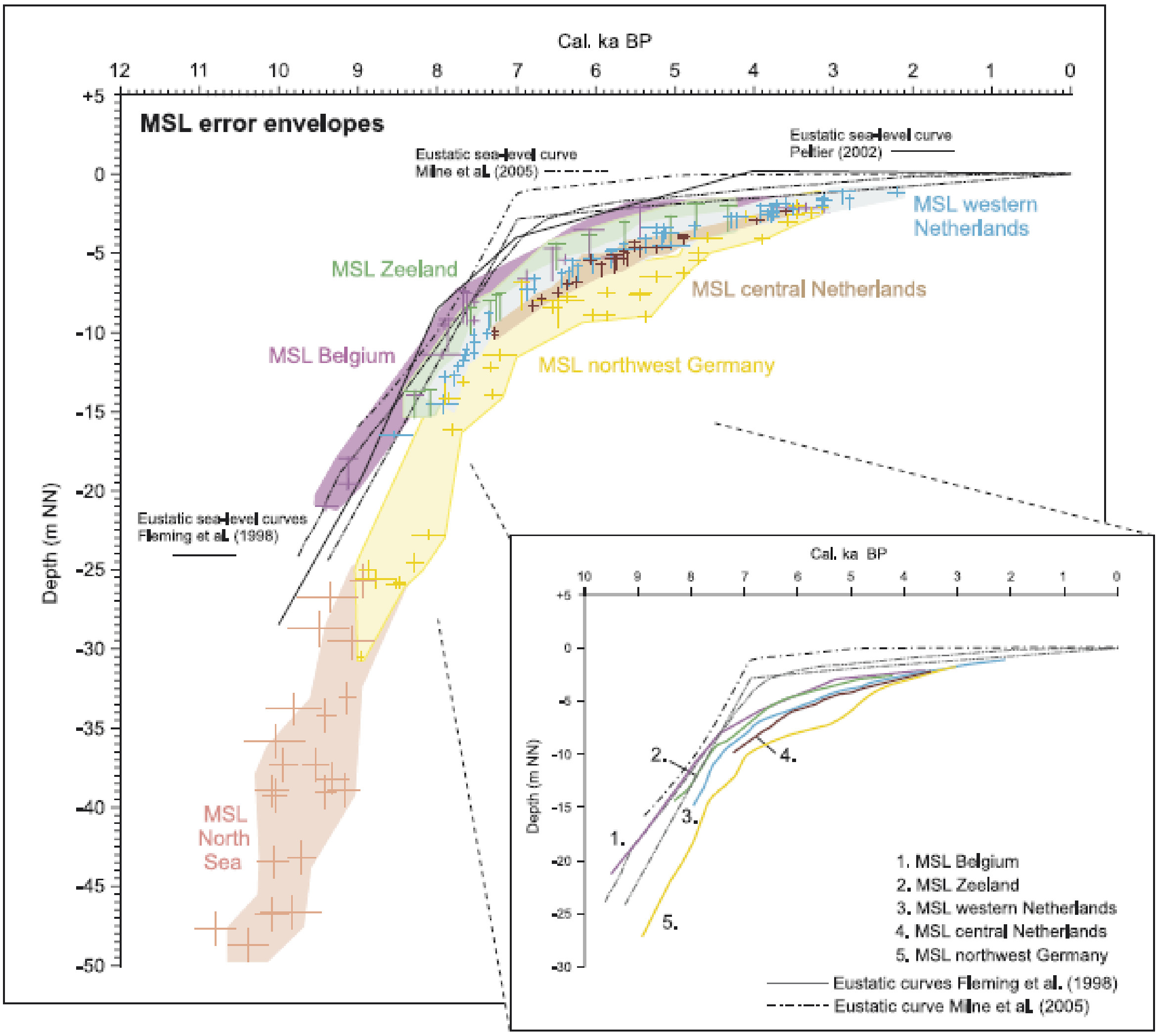


Figure 18. *Image demonstrating the suitability of applying eustatic sea-level curves to discussions of change in sea-level through the Mesolithic* (Vink 2007, 3263)

The rise in sea-level from the end of the LGM led to the eventual formation of the southern North Sea (Figure 19). At the start of the Holocene, there was extensive connectivity between Britain and the continent and though the eastern coast of Britain was not far to the east of the present coast. By 9000BP, the connectivity had reduced and estuaries had formed south of the Dogger Bank. At 8,200BP, the largest inundation event occurred, leading to the complete inundation of the Dogger Bank and the reconnection of the English Channel to the North Sea. This flooding event was caused by a combination of the Storegga Slide tsunami and the discharge of an estimated 1.6 * 10^14 cubic metres of fresh water into the North Atlantic (Weninger 2008, 8). The fresh water loading was caused by the collapse of an ice-dam blocking water flow into the Labrador Sea (Teller 2002), and led to a sudden drop in temperature of 3-6 degrees C for the next 200 years (Weninger 2008, 8). The Storegga tsunami was generated by a submarine landslide on the Norwegian coast (Weninger 2008). The timing of this event in correlation with the rapid eustatic sea-level rise and the glacio- and hydro-isostatic submergence occurring with the 8,200 climatic event, Fennoscandian ice-sheet retreat and associated water-loading of the North Sea basin, this tsunami had catastrophic impacts on the study area, dramatically reshaping the coastline morphology of the southern North Sea basin. By 7,500 BP, the effects of these events had begun to slow and coastline morphology of this region was near to modern limits.

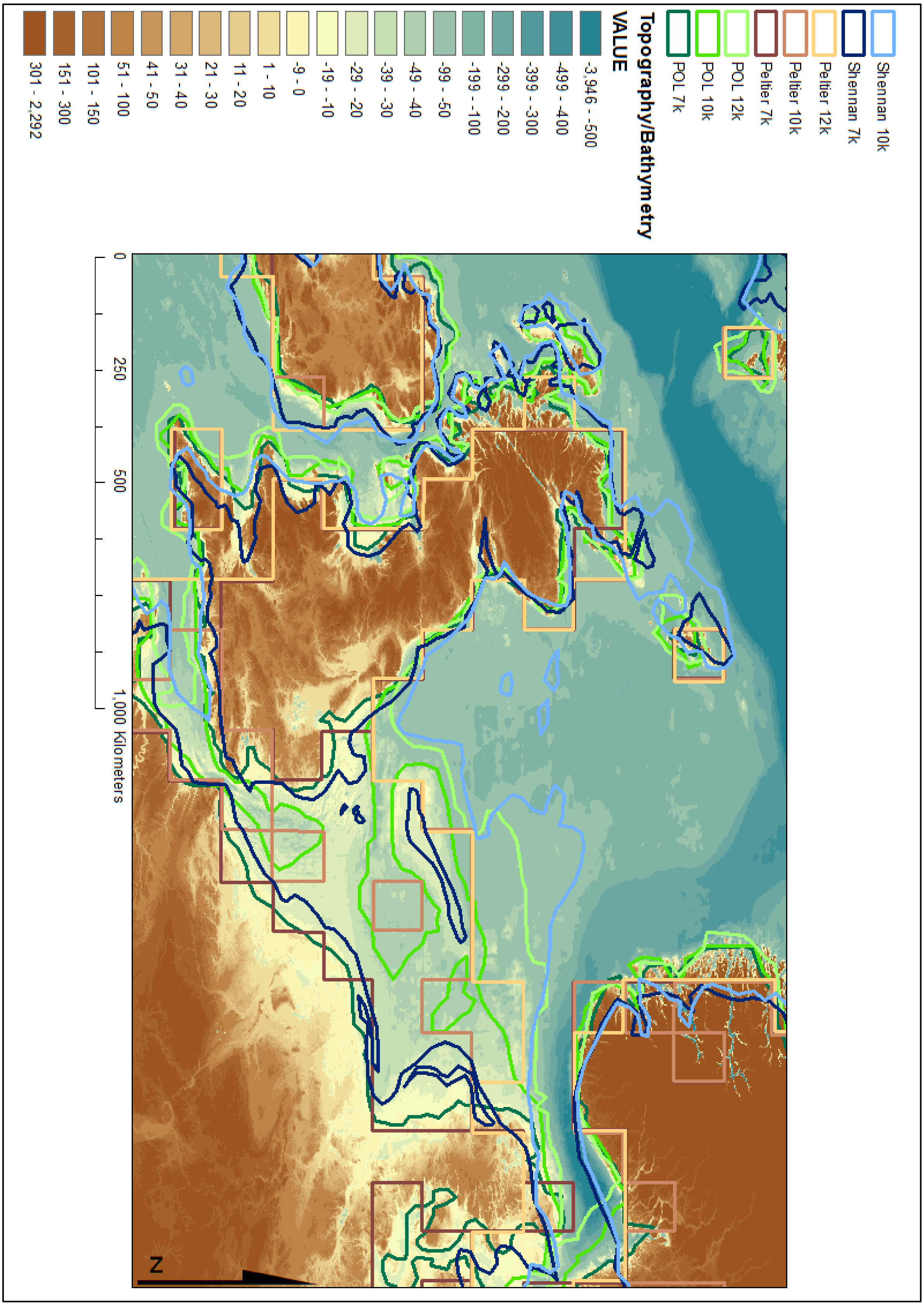


Figure 19 a. *Comparison between RSL and GIA models of North Sea Inundation (Shennan 2000, Peltier 2004 and POL) drawn on GEBCO topography/bathymetry*

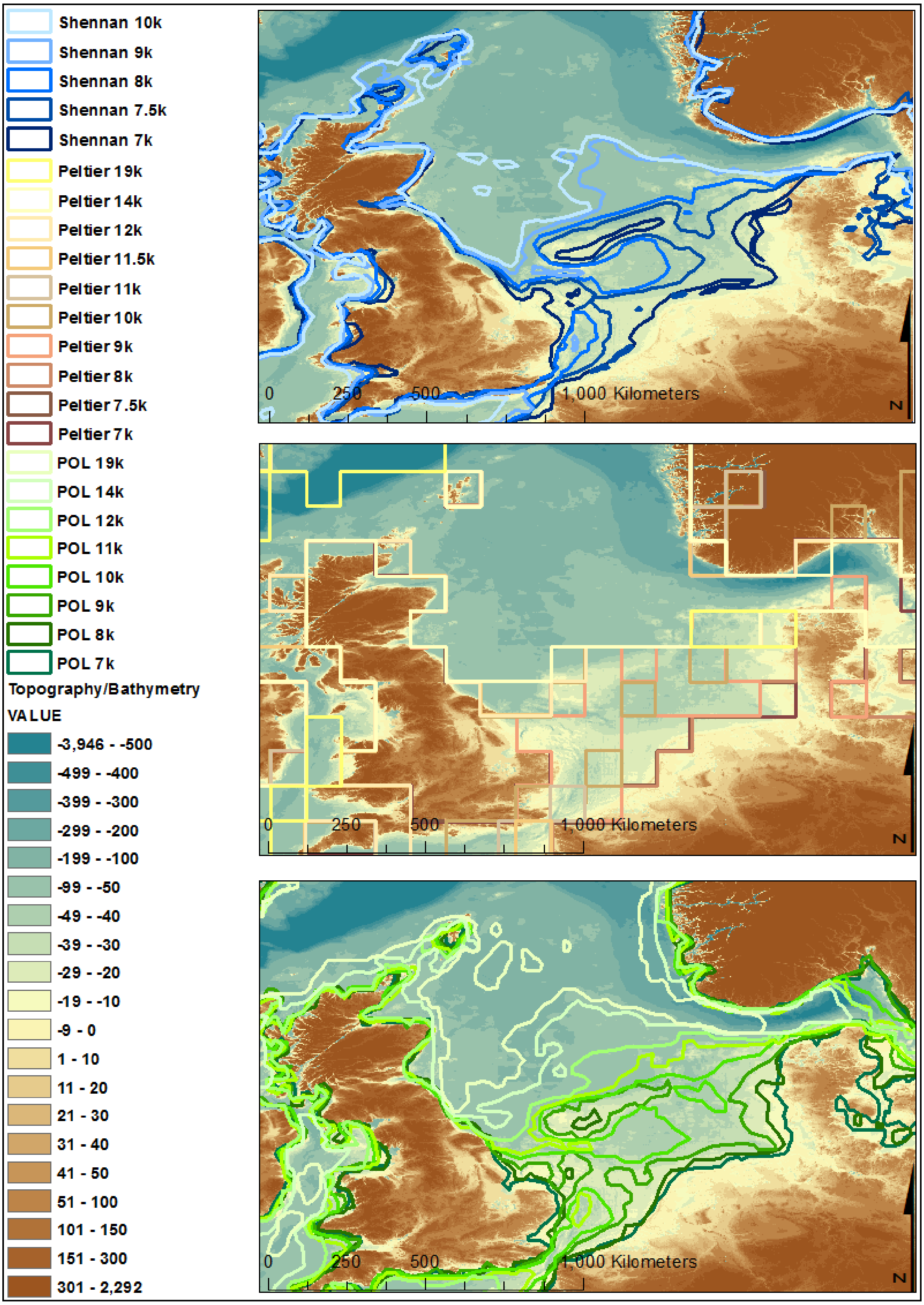


Figure 19 b i. *Coastline predictions from Shennan (2002) ii. Coastline predictions from Peltier (2004) iii. Coastline predictions from POL.*

The models mapping the progression of this inundation fall into two schools, Glacio-Isostatic Adjustment (GIA) models, the POL and Peltier models discussed above, and RSL-driven models, such as Shennan's (2000) model. A GIA model consists of three components, the first of which is an earth model to simulate crustal movement as a sum of hydro- and glacio-isostatic models and tectonic movement dependent on mantle viscosity. Also needed is a model of late Quaternary ice history, and predictions on the distribution of ocean water, or the sea-level equation (Shennan 2006). RSL models depend on the stratigraphic record for direct measurements of sea-level index points as a natural amalgam of the GIA parameters. These sea-level index points, however, rarely form at mean global sea-level, but cover the full tidal range. Therefore, indices are created from predictions of mean high water at the spring tide (MHWST) and the vertical range in which the sediment could have formed (Shennan 2006). A comparison between these two types of model is shown in Figure 19. The POL model has been selected for use in this study as it has the best combination of chronological depth, spatial coverage and spatial resolution of available data.

Vegetation Changes

While sea-level had been increasing since the end of the LGM, the beginning of the Holocene, and the Mesolithic, is marked by increases in surface and bottom water temperature in the North Atlantic and North Sea (Kligaard-Kristensen 2001, 455).

> "Superimposed on the broad climatic changes through the Holocene, a series of short-lived oscillations in the ocean circulation are recorded. The amplitude of these Holocene events appears larger in the early Holocene (prior to 8 ka) than compared with the remaining part of the Holocene" (Kligaard-Kristensen 2001, 455).

Thus, while a rapid rate of eustatic sea-level rise had already begun, the nature of the component oscillations in rise marked the beginning of the Holocene as a period of turbulent environmental alteration. Relative sea-level change and the warmer temperatures following the end of the LGM led to changes in the terrestrial biosphere by the beginning of the Holocene (Bell and Walker 2005, 123-128). Dominant species went through a series of transformations as the coastlines evolved and temperatures began to support warmer-weather vegetation. Arising from these changes in vegetation regimes, is the chronological system of chronozones. These divide the terminal Pleistocene and early Holocene into the following categorization depending on pollen records: Younger Dryas (12,500BP-11,700BP), Preboreal (11,700BP-10,000BP), Boreal (10,000BP-9,000BP), Atlantic (9,000BP-6,000BP) and Subboreal (6,000BP-2,500BP) (Berglund 2007, 192). "High percentages of *Salix* pollen are characteristic of the Younger Dryas, accompanied by a range of herbs of cold and wet, open habitats" (Gulliksen 1998, 250). Approaching the Holocene, the pollen record indicates an increase in the abundance of fern spores before the Preboreal spread of Betula pollen. "The Younger Dryas [to] Holocene transition is also characterized by an increase in aquatic plants and algal productivity" (Gulliksen 1998, 250-251). This spread of Birch forests would have dramatically changed both the texture of the environment (Evans 2003, 45 -- as explained below) and resource availability for Mesolithic communities, giving weight to these vegetation developments. Regional variations of progression of biotic species will be discussed in Chapter Four, however, a general progression can be established beginning with late glacial tundra at the end of the LGM (Bell and Walker 2005, 127). Vegetation in the southern North Sea basin then progressed to the early Holocene Preboreal spread of birch with signs of pine and elm. The Boreal is indicated by an increase of hazel and the dominance of pine taking over from Preboreal birch. The Atlantic, at ~8,000BP, is signalled by the large-scale introduction of lime and an increase in percentages of elm, oak and beech. The Subatlantic, just beginning at the end of the Mesolithic, is heralded by a sudden decline in elm percentages. The cause of this decline has been debated, and it is most recently argued that it was due to disease rather than the crossing of an environmental threshold undermining the population (Price 1991).

Coastal Rhythms

The increasing temperature and sea-level are also reflected in changes to coastal oceanographic patterns and water quality. Marine transgressions and regressions and the changing morphology of the coastline impact the daily rhythms of tide and currents. This can only be examined at the local-scale due to micro-scale variations in geomorphology evolving over time. The rate and character of flooding and ebbing of tidal patterns will be formed by the shape of the coastline, embayment or estuary. Equally, water quality, as defined by salinity, oxygenation and nutrient availability, is determined by the flushing regime of the local system as well as contact with freshwater systems and terrestrial eutrophication. Freshwater sources will equally be shaped by changes in regional sea-level as rivers are swollen and ground water is driven up to the surface by eustatic rise.

The difference in rate and character of change during the early Holocene as compared to that of today, as described above, prompts criticism for the application of ethnographic examples in the characterization of how Mesolithic people would have perceived and reacted to environmental dynamism. Researchers (i.e. Leary 2009) have used recent examples of community response to catastrophic sea level rise as a parallel to discuss the reaction and possible resilience of Mesolithic communities to catastrophic flooding events. In these discussions, they are looking to modern examples of people's relationship with their environments to create a lens through which the nature of past human-environment interactions can be understood. While this can be seen as a useful tool to introduce new models for response, the discrepancy in the context of these events degrades such assertions. Modern examples are not equally situated in a period of consistent dramatic environmental dynamics. The relationship is not strongly analogous; the eustatic sea-level curve (Figure 16) alone demonstrates the difference in rate of change experienced in the Mesolithic as compared to that we are experiencing as a global community today. While we may feel and worry that we are experiencing rapid climate shifts today, and that we, therefore, have insight into the Mesolithic perspective on change, early Holocene rates of change far outstrip those documented today. Following from Jones (2002) and Gosden (1999),

> "I will note that [ethnography], while providing increased knowledge concerning site formation, says little about the social structure which brought the site into being, to say nothing of the responsibilities and moralities involved in the exercise" (Gosden 1999, 58-61).

Especially in the study of the powerfully dynamic Mesolithic, ethnographic examples can have very little application in interpreting perception of a rate of environmental change which far exceeds any modern comparisons.

Defining a Macro-Scale Spatial Extent

Beyond arbitrarily defining a region according to the modern extents of the southern North Sea and those countries surrounding it, the macro-scale approach to this study should be able to usefully inform a spatial grouping which is based in the Mesolithic experience of the landscape. The specific boundaries of the study area for this dissertation must here be sharpened accordingly. Further, it will be argued that the inland extent of the 'coastal environment' is non-standard through this region and would be better addressed on a meso or micro-scale basis, thereby complicating the macro-extents of the research area. A spatial focus based in environmental parameters, so influential to the Mesolithic experience of the world, will be proffered in place of the original study area definition.

Macro-scale interpretations of the Mesolithic in the southern North Sea basin, as will be discussed below, often use analogies such as 'tapestry' (Spikins 2008), 'mosaic' (Amkreutz 2009), 'patchwork' (Price 1991) in order to express the complexity in the creation of unity from the chronological and spatial disparity encompassed in this region. Indeed, Spikins (2008, 5) has argued that it may "seem reasonable to resist any attempt to pigeonhole such diverse societies and environments into some broad plan". However, this area can be usefully considered as a single unit for analysis within its extended spatial context. By applying unifying regional characteristics, we can define and loosely bind a lateral focus to our research while still recognising the diversity contained within it and its role within the surrounding continuum. This facilitates a spatially-organised, single-surface approach designed in keeping with the principal questions posed in this study.

Coastal Focus

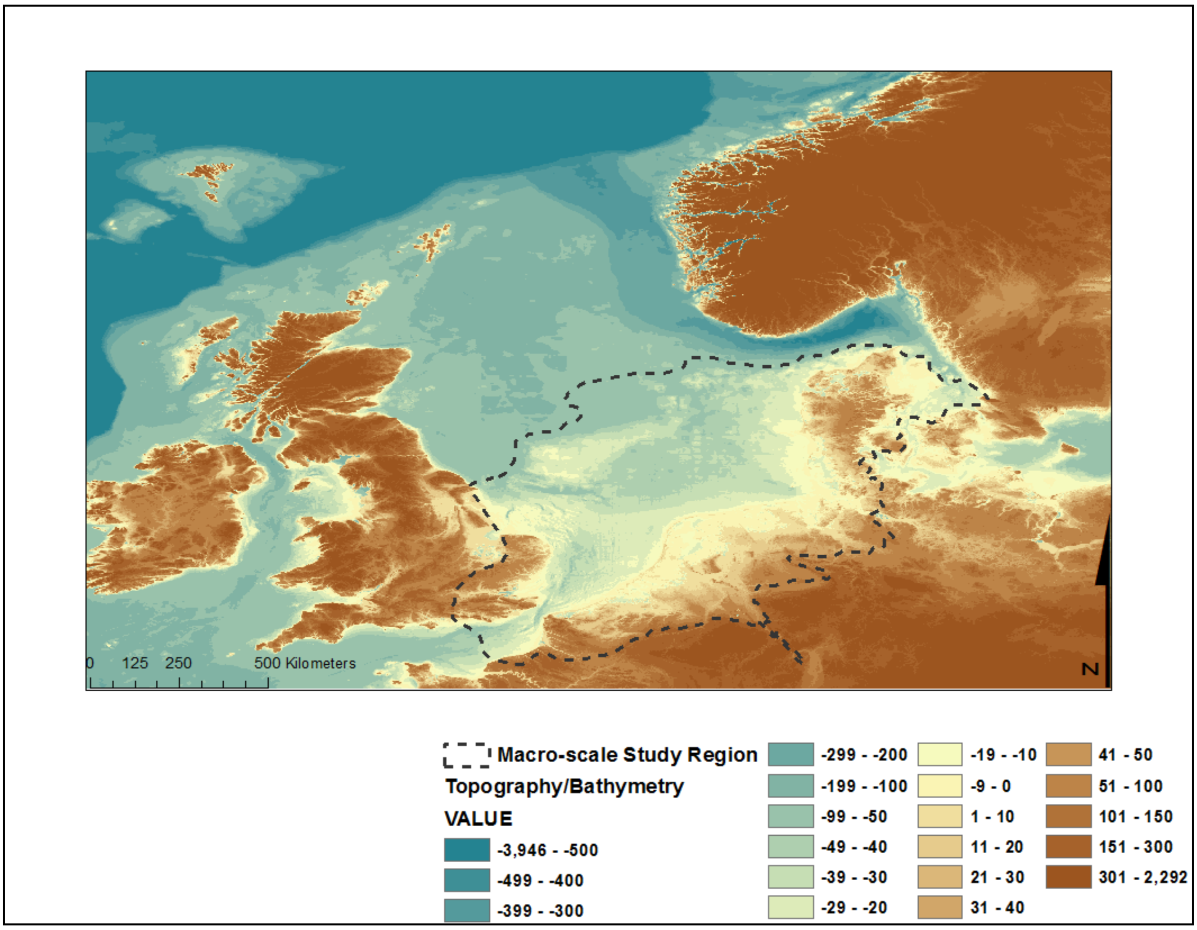


Figure 20. *GEBCO topography/bathymetry of study area and surrounding landscape to illustrate the difficulty in defining a coastal zone.*

The diverse local geomorphologies of this large study region mould the impact of sea-level change and related environmental changes. ‘Coastal’ is not, therefore, a homogenous extent inland from the water-land interface. As the spatial framework of a coastal environment depends upon the scale of approach, this is another scalar entanglement to be addressed in outlining our epistemology. Westley and Dix (2006) comprehensively described the complications in defining a coastal environment arising from the effects of varied topographies and geologies such as those in the inter-tidal zones of the southern North Sea basin.

Westley and Dix (2006), therefore, suggest three primary categorisations of ‘coastal zones’. The first is delineated by the range of tidal inundation; this can cover a distance from metres up to kilometres in extreme cases, such as in the fjords of Denmark. A shallow gradient topography and susceptible geology at the coast can allow water to transgress far inland at each high tide, whereas a steep topography and resistant geology can make tidal land loss negligible. Within the context of this dissertation, this definition focuses too exclusively on the land loss with the encroaching tide or rising sea-level and does not leave enough scope for the inclusion of additional components of environmental change and further impacts of these changes on the interaction of Mesolithic coastal communities with their environment. The second categorisation of 'coastal zone' is dependent on the range of a maritime influenced climate, extending up to several hundred kilometres depending on regional circulation and topography. The third is demarcated by the range of human transmission of a coastal influence; this can expand a 'coastal' zone exponentially depending on the mobility of a Mesolithic coastal community.

Between these latter two definitions, the former of a 'maritime influenced climate' is the most apt for this dissertation. While the focus of the study is on *human* interaction with the coastal environment, thereby perhaps suggesting the categorization of human transmission, the goal is not to study how coastal communities interacted with those inland, spreading their culture, but to understand how these communities perceived and interacted with a dynamic coastal environment directly, on a primary level. Therefore, in delineating a coastal southern North Sea region, the influence of a maritime climate will be the central consideration. Even this narrowed definition does not, however, demarcate a uniform spatial extent inland from the coastline throughout the southern North Sea basin. This must be considered on an individual meso- and micro-scale basis in Chapters Four, Five and Six, taking into account the geomorphology of each region.

Due to the susceptibility of the coastline to transformation caused by sea-level rise, there is a greater immediacy of reaction to climate change in the coastal environment. Evolving coastlines impact daily rhythms of life, including the tidal and current regimes, wave patterns, and water quality. Changes in the established vegetation and fauna occur with rising sea-level and corresponding changes in water quality and nutrient availability. While hinterland and inland environments experience climate change as well, the momentum of response to these stimuli is greater at the coast. Therefore, the likelihood of community perception of environmental change is greatest in this region. The sensitivity of this environment and the various different definitions and resulting spatial extents of a coastal region were taken into account in applying macro-scale boundaries to the research conducted in this study.

Spatial Extent

To define macro-scale study area boundaries, topographic data was amalgamated with Last Glacial Maximum (LGM) ice sheet extents, models of inundation of the North Sea basin and soil typologies. The topographic data preferenced was a global General Bathymetric Chart of the Oceans (GEBCO) gridded topography and bathymetry layer at a 30 second arc grid resolution. This layer was used as background data against which to compare the formation of the North Sea during the study period and to restrict the coastal extent applied. Both Proudman Oceanographic Laboratory (POL) and Peltier (2004) Glacial Isostatic Adjustment (GIA) models for inundation were considered, and shown to be similar for the beginning of the study period (11,700BP). Therefore, the POL model was used due to the higher resolution of available data. While Shennan's (2000) Regional Sea-Level (RSL) driven model was also considered, the chronological extent of available data was not sufficiently deep to include the full study period. These inundation models were used to determine the land extent at the beginning of the study period, and were particularly important in defining the macro-region boundary in the currently-submerged landscape of the North Sea. This region changed from terrestrial expanse to coastal-scape during the study period. Areas to the north, south and inland of the study area were not impacted by rising eustatic sea-levels in the same way. Spikins (2008, 8) argues that the relationship between society and the environment is particularly important and apparent in coastal and wetland environments due to the immediacy of perceivable changes to these landscapes in response to environmental shifts; changes in the water table, currents, tidal regimes and dependent vegetations. If so, then despite the regional 'patchwork' variations, this study region was united by the effects of the rising North Sea and is not so incongruous as to resist amalgamation.

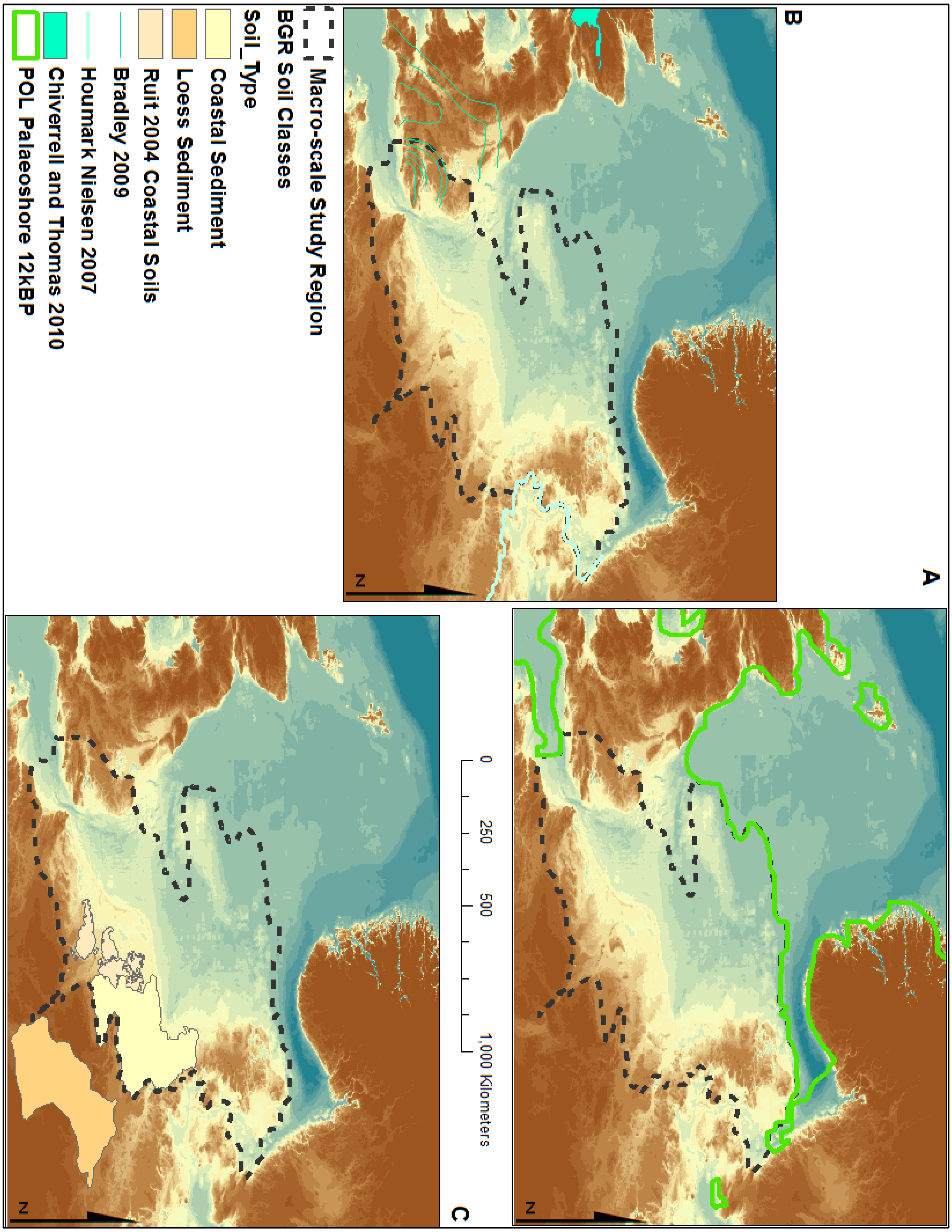


Figure 21 a-c: *Graphically displaying the steps employed to define a macro-scale spatial study focus displayed against a GEBCO topographic/bathymetric layer for background mapping.*

Bradley's (2009) model of ice cover in Britain during the Younger Dryas, the most recent period of extensive ice-cover in the southern North Sea region, was used to examine the ice-scape leading into the earliest Holocene. Similarly, Houmark-Nielsen's (2007) Younger Dryas ice-cover model was used to consider last ice-cover over modern day Denmark. POL and Peltier's (2004) ice-models were originally considered for contribution in acknowledgement of their global application, but due to the more recent explanations of connectivity and subsequent separation of the British and Fennoscandian ice sheets, and the higher resolution of the regional models, these more recent publications were applied. As the crustal response of the southern North Sea basin was not exclusively governed by the smaller cold cycle experience in the Younger Dryas, but was more heavily consequent of the ice-extents at the end of the Last Glacial Maximum (LGM), Chiverrell and Thomas's (2010) model of crustal movement in southern Britain was used to define the study area by excluding the surrounding regions of greater response. The northern Danish tip, which had ice-cover at 19ka was, however, included as part of the terrestrial extent of this landscape at the start of the Mesolithic as the ice thickness over this small area was much thinner than through the rest of the Fennoscandian shield and, therefore, had less effect on crustal rebound. The implications of this inclusion on the topography and isostatic uplift patterns of the macro study-area are discussed below. Soil charts from the Bundesanstalt fur Geowissenschaften und Rohstoffe (BGR) and from Ruit (2004) were used to select the topographic contour applied to define the eastern, inland continental reaches of the macro study-area. The loess-covered regions of modern Germany were excluded as they display a Mesolithic record distinct from that in the coastal soils, included in this dissertation's spatial focus.

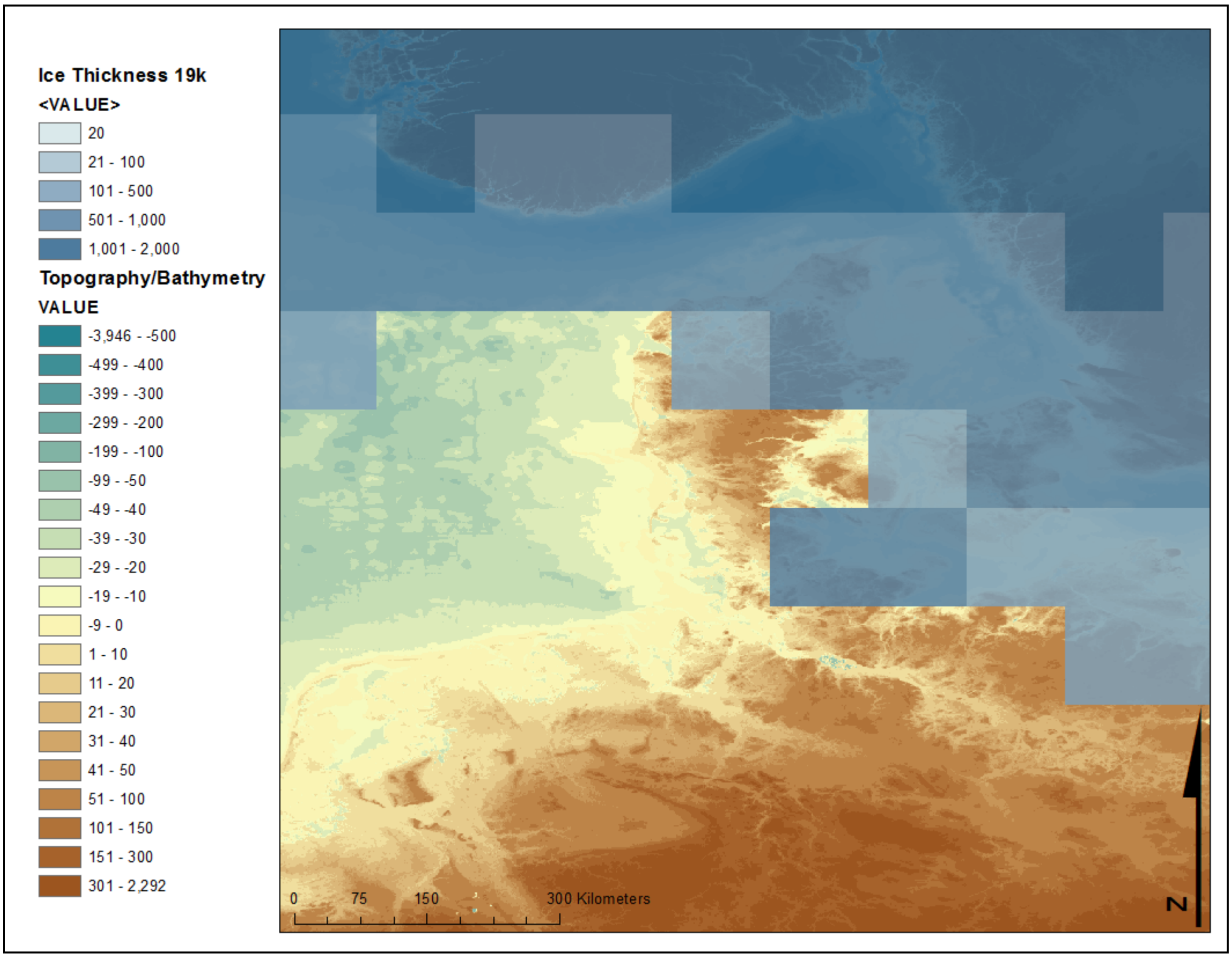


Figure 22. *Thickness of ice-cover over Denmark at 19k BP following Peltier (2004)*

The land encompassed in this study was outside the direct ice cover during the LGM (22-19 ka BP); therefore the isostatic uplift of this region, while displaying local variations, follows a similar pattern in the context of eustatic sea-level rise. The exception of the ice-covered Danish tip experienced relatively light ice-thickness at the LGM (Figure 22). Thus, while this tip has displayed greater uplift than the rest of the macro study area, this response was far out-weighed by that recorded in the surrounding region outside of the study's focus. Further to the north, on both sides of the North Sea, the larger isostatic and tectonic crustal rise dominated the relative sea level curves and, therefore, the impact of Mesolithic eustatic sea-level rise is of a different character to that within the bounded study area.

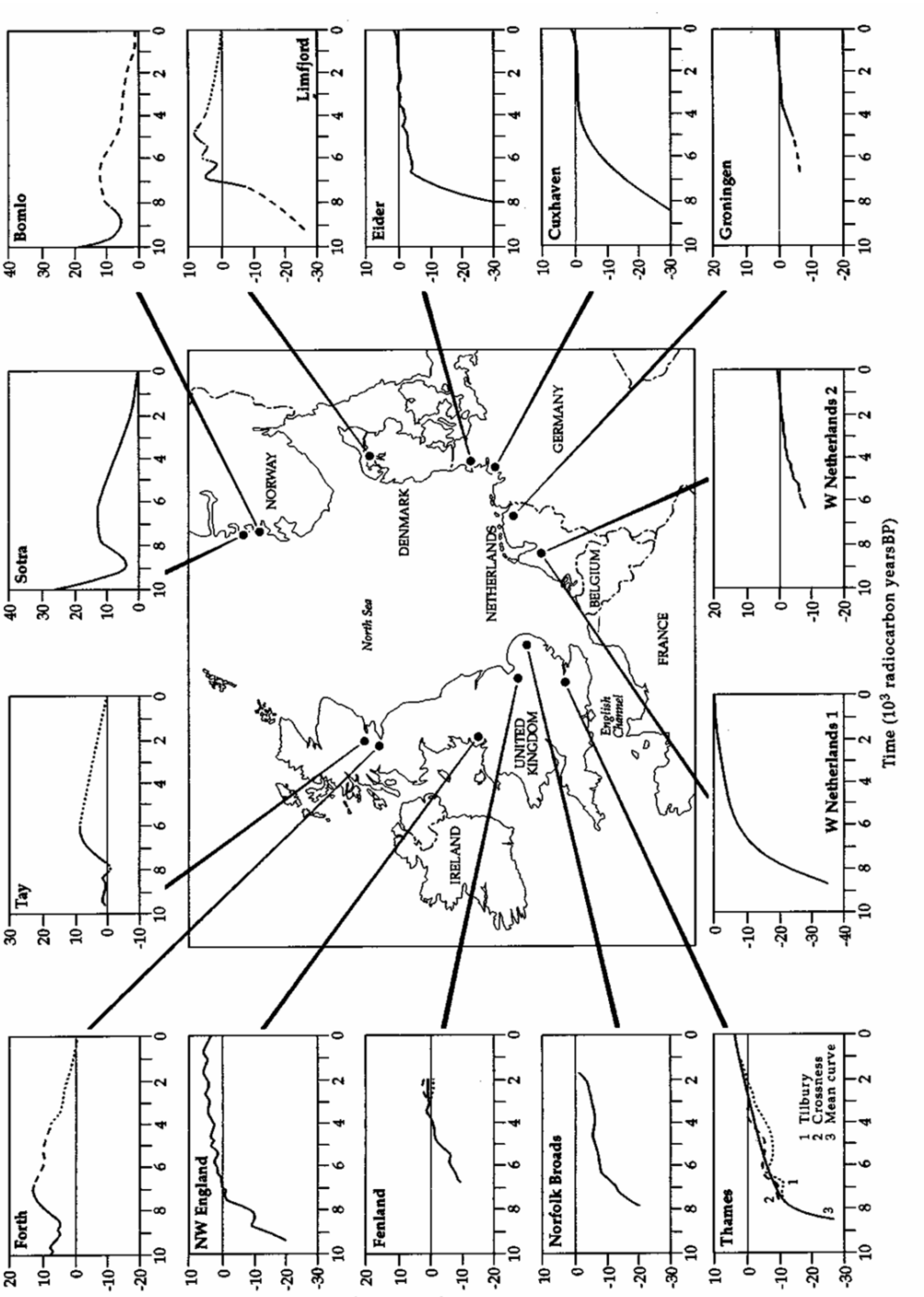


Figure 23. *Map of regional sea level curves around North Sea basin:* Demonstrating that the relative sea-level change within the defined macro-study area unites this region and is of a different character to that in the surrounding area (Shennan 1987, 29)

Macro-scale archaeology from the southern North Sea basin

The macro-scale picture of the southern North Sea has been described by archaeologists such as Richard Bradley (2007), TD Price (1991) and most recently by Geoff Bailey and Penny Spikins (2008), and Vince Gaffney and Simon Fitch (2009). The spatial extent of these macro-scale studies varies between authors; however, they each encompass important stretches of the southern North Sea basin. Bradley's literature is focused on the prehistory of Britain, Ireland and Scandinavia, while Price's summaries focus on the data coming from Denmark, Norway and Sweden. Gaffney and Fitch's new publication frames their work in the Dogger Bank, and therefore, centres on submerged landscapes and the terrestrial borders to these, extending largely through the same region considered by this dissertation. The region discussed by Bailey and Spikins' collection of papers is the most synonymous with that discussed in this paper, covering the same extent, though dividing it into meso-scale regions as dictated by country borders. Therefore, this following discussion will prioritize the arguments from the above macro-scale literature which are relevant to the coastal region of the southern North Sea basin as described above.

Despite the above-mentioned variations in spatial extents of macro-scale literature through the North West European Mesolithic, several common themes emerge through these discussions. Firstly, the complications in establishing a suitable chronological boundary applicable to the full study region are very apparent from the macro-scale literature. In many ways our temporal definitions have not advanced since Clark's (1932) publication, and are additionally confounded by the multiplicity of approaches applied to defining the time-boundaries of the Mesolithic. Conceptually, the sense of a growing familiarity, a society increasingly like our modern one, of this region over the course of the Mesolithic can be seen throughout the macro-scale southern North Sea literature. This plays into the remnant tendencies to classify the Mesolithic as a transitional era, as argued against in Chapter Two, which are seen in the broad regional literature but also challenged by it. While most current authors in Mesolithic research would argue that we have overcome this ideology, it still lingers in our macro-scale descriptions of the period. Further reflecting this are the generalizations of both dynamic environmental and social change, summarizing changes in inundation, vegetation, technology and culture as unilaterally smooth progressions from the end of the Palaeolithic to the adoption of the Neolithic. An Ertebølle model is uniquely prevalent in discussions of cultural change, despite meso-scale variations to this model within the southern North Sea basin. While these papers emphasize the diversity of this region in middle prehistory, they encourage an often false sense of homogeneity through advancing the dominance of this model of Mesolithic societal change.

Chronology

It is immediately clear from the macro-scale literature that the chronology of the Mesolithic era is not standardized throughout the macro-scale region of the southern North Sea and that these temporal boundaries are time-transgressive. Nor are the absolute dates applied by macro-scale literature uniform. Literature addressing this period in North West Europe largely continues to propagate a chronology of the Mesolithic beginning with the Holocene and ending with the adoption of Neolithic agricultural techniques. A few studies, focused primarily on palaeoenvironmental research do adopt an ecological close to the Mesolithic based on the onset of the Climatic Optimum at ~7000BP.

By applying an ecological boundary to the beginning of the Mesolithic, an absolute temporal boundary can, at least, be determined through dating the beginning of the Holocene. While global eustatic sea-level has risen since the end of the Last Glacial Maximum (~19,000BP) as discussed above, this, compounded with changes in vegetation and the sharp boundary in the stratigraphy of this region at the beginning of the Holocene do provide a chronological boundary at the end of the Younger Dryas which has been dated to 11,700BP (Walker 2009). However, this is not so with the cultural boundary, less specifically datable, with the adoption of Neolithic agrarian practices. As established by the discussion of shell midden decline in Chapter Two, the adoption of new technologies and rejection of older traditions infrequently occurs immediately upon introduction, but is more often a gradual process. Equally, there are large difficulties in differentiating between progressive tool types especially within non-stratified surface finds; typologies are not often so immediately diverse as to make their categorization easy and unqualified. Absolute dating can be equally problematic in localities where single radio-carbon dates from minimally-provenanced material have been extrapolated to date Neolithic adoption over large regions. However, the importance of stitching together the material, ecological and societal evidence of Mesolithic life to create a temporal structure can be seen through the extant macro-scale literature; one without the other provides an incomplete picture, difficult as cultural components are to reliably date. As Price says,

> "Archaeological remains exhibit a number of dimensions of variability, including time, space, and form (cf. Spaulding 1960). It is futile to presume that each of these aspects will coincide neatly in readily definable chronological and cultural units (cf. Stoltman 1978). The Mesolithic is not associated exclusively with the utilization of microlithic tools, nor with the exploitation of forests and coasts, nor with the domestication of the dog" (Price 1983, 762).

Papers also vary between different sets of dating practices and standards, further complicating the temporal range of the Mesolithic. The use of a multiplicity of dating conventions; BC, cal BC, BP and cal BP; contributes to the lack of integration of data between authors and especially between disciplines which conventionally prefer one system to the others. Achieving an amalgamation of components to create a macro-scale time-stamp for the Mesolithic is additionally derailed as ecological studies tend to a preference for cal BP dates, while papers discussing cultural patterns and characterisations more often describe dates in the BC system. Homogenization of dating practices and further transparency of methodology should be instrumented to advance co-operation and accuracy of cultural and environmental models of the southern North Sea basin's Mesolithic period, which would ameliorate this difficulty in defining an accurate and universally applicable macro-scale chronological range for the Mesolithic in North West Europe. While there is an understandable goal to define such temporal boundaries, these must always be diffuse due to the large degree to which one period impacts another. A chronological focus should not exclude a comprehension of the influences of those eras on either side.

Growing Familiarity

Repeatedly described, in macro-scale literature of the North West European Mesolithic, is an understanding of a growing familiarity of environment, landscape and culture. "In the different spheres of environment, subsistence, settlement and society, we can come to an understanding of the Mesolithic world [becoming more similar to our own]" (Spikins 2008, 8). This concept of emergent recognisability of the Mesolithic world stems from the dramatic increase in sea-levels and modernization of the coastlines of the North Sea basin. Vegetation and temperatures, too, are increasingly similar to our own environment. There is a change "in scale of observation from the vast perspectives of the Palaeolithic era dominated by major… biological changes to the smaller-scale rhythms of everyday life and ritual that come more sharply into focus in the Mesolithic and later periods" (Bailey 2008, 371). We begin to empathise with and try to visualize the Mesolithic world, more than we do when studying earlier prehistory. The increased fluency between this period and our own carries advantages in the greater access to archaeological and palaeoenvironmental data, but can be problematic as an instinct to apply modern paradigms to prehistoric data can lead to inaccuracies in interpretations. While the reduction in scale, as argued by Bailey above, creates an instinctive relationship between modern day-to-day understandings of time, space and the environment, care must be taken in directly correlating these with prehistoric perceptions. As macro-summaries develop this pattern of increasing modernity of the prehistoric world from the beginning to the end of the Mesolithic, this large-scale understanding is not borne out in meso-scale descriptions of especially the early and middle Mesolithic during the most rapid and dynamic periods of environmental and cultural change, a world which was still very dissimilar to our own.

The commonly-held picture of increasing modernity is reflective of the original conceptualization of the Mesolithic as a transitional period, beginning with Westropp and Lubbock and carried forward by Clark. As Bailey (2008, 371) suggests, we are finally moving beyond this ideology. He says the only way in which this period should be considered as 'transitional' is in "transition from a world that is largely alien to us, to one that is increasingly familiar". However, these ideas still linger throughout, especially, our current macro-scale publications and are still being actively argued against. This literature (especially Bailey and Spikins 2008, Gaffney et al 2009) remains engaged in establishing this period as a developed stage independent from the earlier Palaeolithic and later Neolithic, a battle fought since the earliest establishment of the Mesolithic as an archaeological period. The re-conceptualization of this period as a "period of dynamic change and innovation, rather than a time of cultural degeneration as it has often been portrayed" (Price 1991, 211) has reflected improvements in technology and methodology in Mesolithic research. These refinements are also displayed in the 'patchwork' and 'tapestry' analogies applied to this period (Price 2000 and Spikins 2010 respectively) as smaller-scale understandings of diversity within the broad North Sea basin illuminate and are incorporated into macro-scale generalizations disproving the notion of a straight step-wise progression from Palaeolithic to Neolithic through the Mesolithic.

Ertebølle model of cultural change

Named after the type-site in Danish late Mesolithic archaeological studies, the Ertebølle model is used as basis for understanding cultural evolution in the Mesolithic of the southern North Sea basin, and is the biggest lingering impact of the conceptualization of the Mesolithic as a transitional period. Discussions of cultural changes in the macro-scale literature from the Mesolithic southern North Sea basin generally follow an Ertebølle model in three senses; in the change of tool types from larger lithics to smaller, more geometric points, in the growth of communities from small, mobile groups with low complexity to large, complex and sedentary groups, and in the shift from a predominance of inland settlements or temporary camps, to those in a more coastal environment.

Price (1991, 216) discusses the change in Mesolithic tool types toward smaller, and more geometric forms using smaller cores of lower quality flint. He characterizes the Mesolithic of northern Europe by "similarities in technology and in types of tools and other equipment used" and discusses the growing diversification in form and specialization in function. The shift from Upper Palaeolithic to Early Mesolithic and progression in the Mesolithic is distinguishable by a newly-heightened "diversity of raw materials, techniques of stone working and tool types" (Bailey 2008, 359) and also by the increasing importance of bone, antler and wooden tools. The adoption of ceramics in the last Mesolithic is also a frequently mentioned part of the Ertebølle model, especially in the north of the southern North Sea region (Gebauer 1990, 260; Price 1991 216).

Settlements in the early Mesolithic are generally described by the macro-scale literature reviewed in this study as seasonal or short-term encampments on inland lakes and river valleys. The middle Mesolithic shows a progression to more sedentary sites in coastal environments as the changing climate chokes out access to inland waterways. The later Mesolithic, with its increased suggestions of human modification of the environment, shows several different common site-types: coastal occupations containing indicators of both marine and terrestrial diets, smaller seasonal coastal sites with a suggested focus more specifically on procurement, inland camps for trapping, and inland lakeside settlements which may have seen year-round, sedentary occupation (following from Price 1991, 220). Sedentary coastal occupation is argued for at several sites around the southern North Sea basin in the late Mesolithic (i.e. Andersen 1986). Through these discussions, mobility across the landscape is accentuated as a fundamental part of Mesolithic life and the sequential reduction of migratory distances is, on the macro-scale, used to characterize this period of prehistory.

The macro-scale approach to studying the Mesolithic in the southern North Sea basin provides a strong context and background to the key issues of the experience of the early Holocene landscape. While not necessarily apparent on the human-scale, the macro-patterns of temperature increase, ice-retreat, sea-level rise and vegetational shifts were the foundations of the dynamics of this southern North Sea landscape. Exploring the implications of the broad ecological patterns, however, emphasises that these were modified over smaller-scale regions. Eustatic sea-level rise, for instance, was ameliorated and augmented by local isostasy in the early Holocene. While this region is united in its lower isostatic response, leading to the dominance of eustasy in regional sea-level curves, differences (explored in Chapters Four, Five and Six) expressed in meso- and micro-scale landscapes are still a component of the Mesolithic southern North Sea basin. The influences of the changing coastline morphology, due to sea-level rise, on the coastal rhythms of tides, currents and weather also highlight the need for research into the impacts of macro-environmental shifts on the micro-scale if the goal is to interpret Mesolithic perception of these changes. The macro-archaeological interpretations over the southern North Sea basin each emphasise the heterogeneous, patchwork, non-uniform nature of the Mesolithic in this region (Spikins 2010, Amkreutz 2009, Price 1991). Yet, the generalisations of this period across North West Europe do not reflect these assertions; rather amalgamate the period into a series of well-conformed steps from the Palaeolithic to the Neolithic following the archaeology from the Ertebølle type-site in Denmark. The need for greater diversity in this model of Mesolithic cultural progress will be argued in Chapter Four. If we are to reflect the interpreted societal and environmental patterns presented in the macro-scale literature for this region in our archaeological generalisations, the meso- and micro-scale archaeology must be consulted. Despite this limitation, the macro-scale environmental research does resolve the definition of the spatial extent and shape of the study area, both by providing a focus to the forming southern North Sea basin and by aiding refinement of a coastal extent of this region. This large-scale approach gives insight into the meaningful broad patterns of Mesolithic life and provides a means of grouping the landscape into useful units for interrogation. It does not, however, provide sufficient resolution to push forward our constructions of what it meant to be Mesolithic in this landscape.

Chapter Four: The Meso-Scale

The broad extent of the southern North Sea basin comprises a region diverse in geomorphology, vegetation and culture, over both space and time. Macro-scale discussions of this study area have been shown to elucidate patterns of change and to, thereby, unite a spatio-temporal range for study, but also obscure the environmental and cultural textures experienced by Mesolithic communities and individuals living in the southern North Sea basin. Therefore, a meso-scale approach will be explored in this chapter in order to provide higher resolution information and analyses. The macro-basin is traditionally divided into meso-regions by applying modern political boundaries. It will be argued that this actively inhibits research. Therefore, the use of areas of isostatic uplift and topographical changes is proposed as a more organic and useful means of spatial division. The themes distilled from the macro-scale archaeological interpretations discussed in Chapter Three will be supported and challenged through the meso-scale archaeology from the southern North Sea basin and these regional approaches considered in the context of the history of Mesolithic archaeology as discussed in Chapter Two.

Spatial Divisions

The means by which the defined macro-scale basin will be divided into meso-scale catchments differs strongly from the bulk of established literature. Inappropriate modern spatial demarcations and labels will be replaced by those created from local topography, crustal uplift rates, sediment typologies and artefact types. The need for defining spatial divides according to specifications extending beyond pragmatic concerns stems from the increasingly recognised importance of the perception prehistoric people had of their own region. Mesolithic communities living in the southern North Sea would have perceived and understood their own spatial configurations, now inaccessible to us as researchers. "[The definition of study areas would] benefit from a greater focus onto the act of perception by human actors" (Wheatley 1992, 136). This implies a normative approach, advancing a claim that an area was recognised as an entity in the past. Such a statement bears the risk of being fundamentally wrong, in that it could "make a false claim that the area was real, when in fact it was not recognised" (Wheatley 1992, 137). Wheatley (1992, 137) supports the use of this approach only in "short-term, context specific studies of defined areas". Therefore, while a normative approach is sympathetic to the aims of this study, over the wide chronological and spatial range included, this must be reinforced with geological and environmental parameters which suit and heuristically guide the conceptual foci of our main research goals. Maps are reflective of the specific cultural subjections of the creator. As we are now unable to definitively chart a landscape, particularly those on the meso- and macro-scales, from the resident Mesolithic perspective, should we not transparently and wilfully direct thought and interpretation to match our study aims through our own graphical representations of space?

Discussions of regional palaeoenvironmental change and Mesolithic archaeology in the southern North Sea are, nearly without exception, geographically or spatially organized in terms of modern country boundaries: Denmark (Andersen 1987, Gebauer and Price 1990, Blankholm 2008), north-west Germany (Jochim 1998, Behling and Street 1999), the Netherlands (Peeters 1999, Bos et al 2005, Verhart 2008) Belgium (Gob 1985, Crombe 2002) and south-east England (Jacobi 1978, Brown 1997). Of these, it could be argued that the most appropriate is the separation of Britain as an entity. Its formation as an island during the Mesolithic promotes its discussion as an independent unit. However, the dramatic modification of the landscape wrought by rapid sea-level rise during the early Holocene as well as the political connotations associated with the term severely hampers this usage as well. The limitations of applying these modern spatial divisions as a framework for the southern North Sea basin in prehistory are similar to those introduced by conceptualizing the Mesolithic as a 'Transitional'. By framing the study-region from a top-down approach, restricted to the modern view-point, the perception of Mesolithic people is undermined and excluded from our interpretations. In this case, the two scales of approach, modern macro-scale and prehistoric micro-scale, are incompatible. In creating a macro-scale framework, the integrity of the micro-scale must be complemented.

The use of political borders is not without logical roots and purpose. These are the pragmatic criteria undermined by Wheatley (1992) in GIS studies. They provide a convenient way to orientate the reader in space and to structure literature which takes into account work conducted by researchers in these countries, often guided by the priorities of the governing bodies of archaeology within these national borders. However, their inclusion in the title of Mesolithic research misdirects focus to interpretations based in an inapt understanding of a geography which did not exist until thousands of years later.

Funding applies an additional pressure in organising literature through political and economic boundaries. National or regional funding, earmarked for study within a specific region is fundamental to the development and practice of archaeology. However, the nationalisation of this funding can lead to a spatial framework for research more determined by practical considerations of finance than by the archaeology. Many such national and regional research frameworks have been in recent development (South-East, North-East, West-Midlands, Yorkshire, Wales, Eastern Counties, North-West, East Anglia, etc. Regional Frameworks ranging from 2005 to present day) working to unify archaeological work conducted within a particular region in order to provide a strong basis for conducting future research. Such programmes with national funding and political influence are obviously essential in order to avoid further inconsistencies between research frameworks, to promote the cause of archaeology throughout each individual country and within Europe as a whole, and to provide the best opportunities for efficacy of research. However, the delineation of national borders in spatially framing these regional discussions is a modern contrivance which is no longer suitable; our fundamental theory and our goals have advanced beyond this. In 2005, Gallaty argued that landscape-based approaches to archaeological research of European prehistory was on the brink of maturity transcending narrow, modern political agendas; surely six years later we should be advocating an approach which reflects this growth. Instead, even large, collaborative projects such as the North Sea Prehistory Research and Management Framework (Cohen 2009) introduce the scope of their work with a map depicting not only current national borders, but territorial waters as well. The large degree of variation in the spatial resolution of prehistoric find spots between countries and the dating of these finds, for instance, is but one example indicative of the detrimental effect of that the lack of consistency between national approaches.

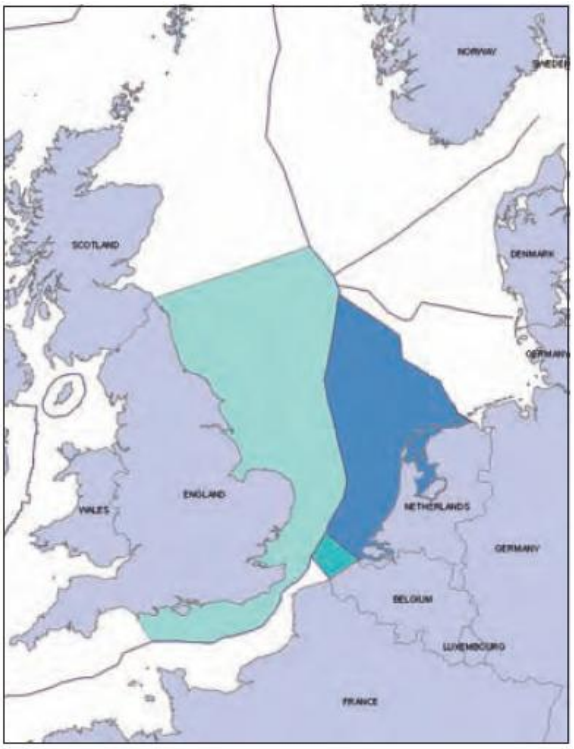


Figure 24. *First map used in the publication of the North Sea Prehistory Research and Management Framework used to depict the project's geographical scope* (Cohen 2009, 9)

Collaboration between projects and integration of a spatially wider context for research is, however, necessary in order to define research areas more organically but must still be framed thoughtfully and in harmony with primary research aims. As Verhart (2008, 181) states, "[an] important factor for the future is international cooperation. Many of the (spatial) patterns we think we have identified in our archaeological material might well stem from contemporary cultural barriers. More cooperation between archaeologists involved in the Mesolithic… might put a different perspective on these patterns and in time render them obsolete." The use of 'contemporary cultural barriers' is inhibiting Mesolithic research.

This argument should not undermine the term "southern North Sea basin" as a Mesolithic-appropriate term as its formation had the greatest impact on the coastal communities of this study area. It "led to progressive inundation of the continental shelf, removed extensive areas of lowland territory, breached land connections,… brought existing hinterlands within reach of milder 'oceanic' climates and culminated in the creation of entirely new coastal landscapes" (Bailey 2008, 358). The growing expanse of the North Sea would have been in the consciousness of Mesolithic coastal communities in this region.

Uplift and Subsidence in the southern North Sea basin

Research within the continuum of the southern North Sea basin as defined in Chapter Three will be organised along the diffuse boundaries of regions I-VII (Figure 25), created on the basis of GIS analysis of GEBCO topography and bathymetry, POL, Peltier (2004) and Shennan (2000) ice and inundation maps and the local crustal uplift and subsidence patterns here described. By using these parameters to determine meso-scale regions for study, we are creating breaks into the otherwise single-surface continuum of the southern North Sea basin and beyond which help to organise and structure research. Importantly, these breaks are based on the same components of life in the early Holocene that we are exploring. We ask if and how Mesolithic communities perceived changes to their environment. Therefore, we are separating these diffuse spatial foci based on alterations occurring in the land and seascapes in response to eustatic sea level rise and isostatic response to ice retreat, and on soil types which can underpin the texture of these shifting e-scapes. These rough regions are displayed through a colour spectrum as the macro-scale was bounded with a dashed-line in order to emphasize the diffuse nature of these lines. People moved within these regions, between them, through them and all around them. By drawing lines, by demarcating study borders, we beg the question of movement and this motion across an unbroken landscape, as argued in Chapter Two, forms the basis for Mesolithic interaction with, and perception of, the shifting southern North Sea environment. In this way, marking out intentionally penetrable boundaries supports a research focus centred on active engagement with this single-surface region while still allowing the requisite breaks into a spatial analysis.

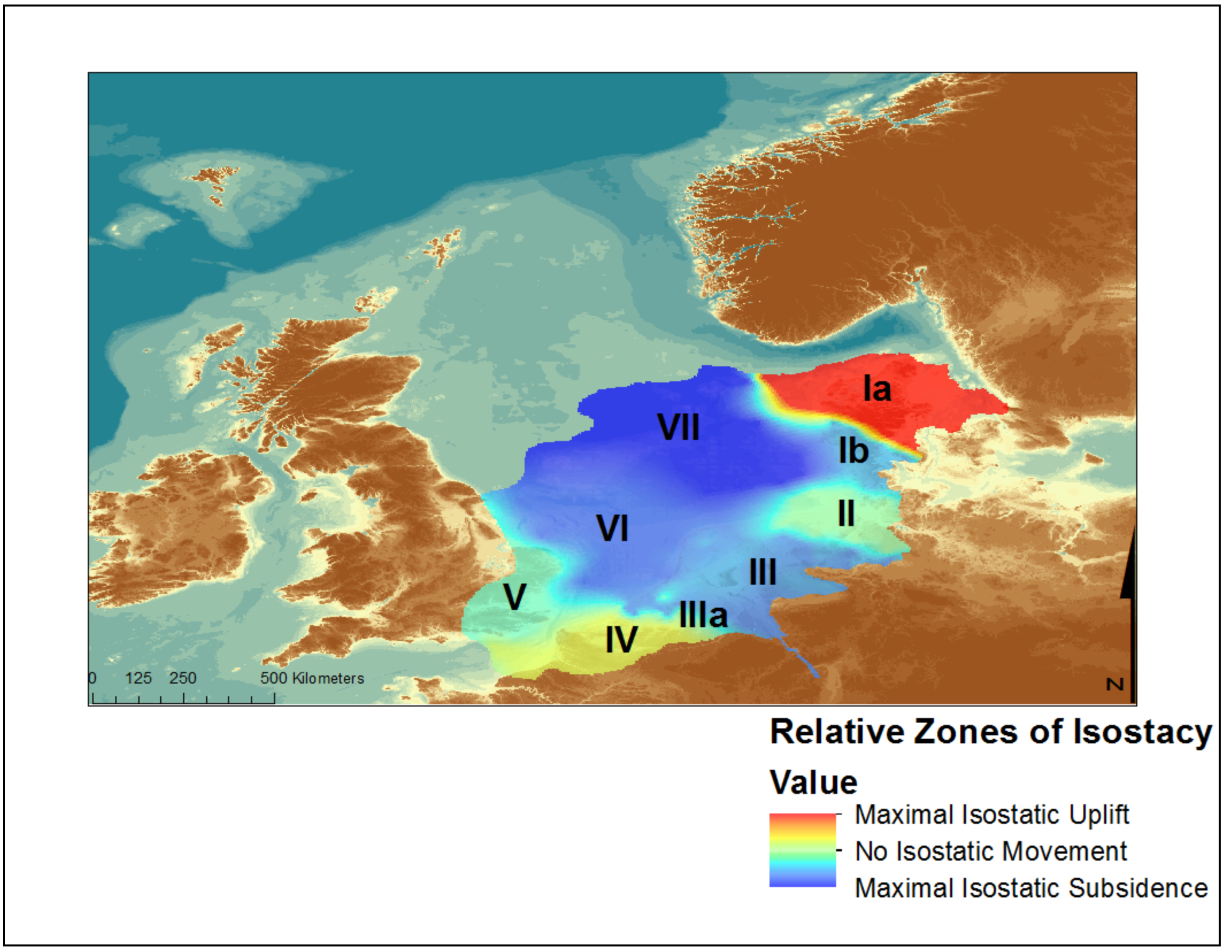


Figure 25. *Meso-scale regions determined by relative areas of isostacy contained within the diffuse macro-scale study area drawn on GEBCO topo/bathymetry*

Research into the regional sea-level (RSL) curves of the southern North Sea basin has revealed a complex pattern of differential crustal movement between Belgium, the Netherlands, North West Germany, Denmark and the submerged landscape of the southern North Sea (Lambeck 1990, Kiden 2002, Vink 2007). The complications registered in the RSL curves are a product of the intricate relationship between three factors operating on multiple space-time scales; eustatic increase in global sea-level, tectonic uplift or subsidence of the crust, and the isostatic "adjustment of the lithosphere in reaction to the mass redistribution associated with spatially and temporally changing ice, water and sediment volumes" (Vink 2007, 3249). While the component of eustatic sea-level rise, as discussed in Chapter Three, is a function of time only, tectonic and isostatic movements are functions of both time and space (Vink 2007, 3249-3250). Thus, they present an opportunity for a geologically-determined spatial framework for this study. The isostatic component of the southern North Sea crustal movement is related mainly to the rebound and subsidence of the region affected by the Fennoscandian ice-sheet at the LGM (glacio-isostatics) and to water (hydro-isostatics) and sediment loading (Vink 2007, 3250); as post-glacial sea-levels rose, the weight of water and increased sediment contributed to the subsidence of the southern North Sea (Kiden 2002, 535). Of these, the glacial impact is the greatest, followed by the hydro-isostatic component in the submerged regions of the basin; this water-based component does not, however, exert great pressure on the coastal zone (Vink 2007, 3267).

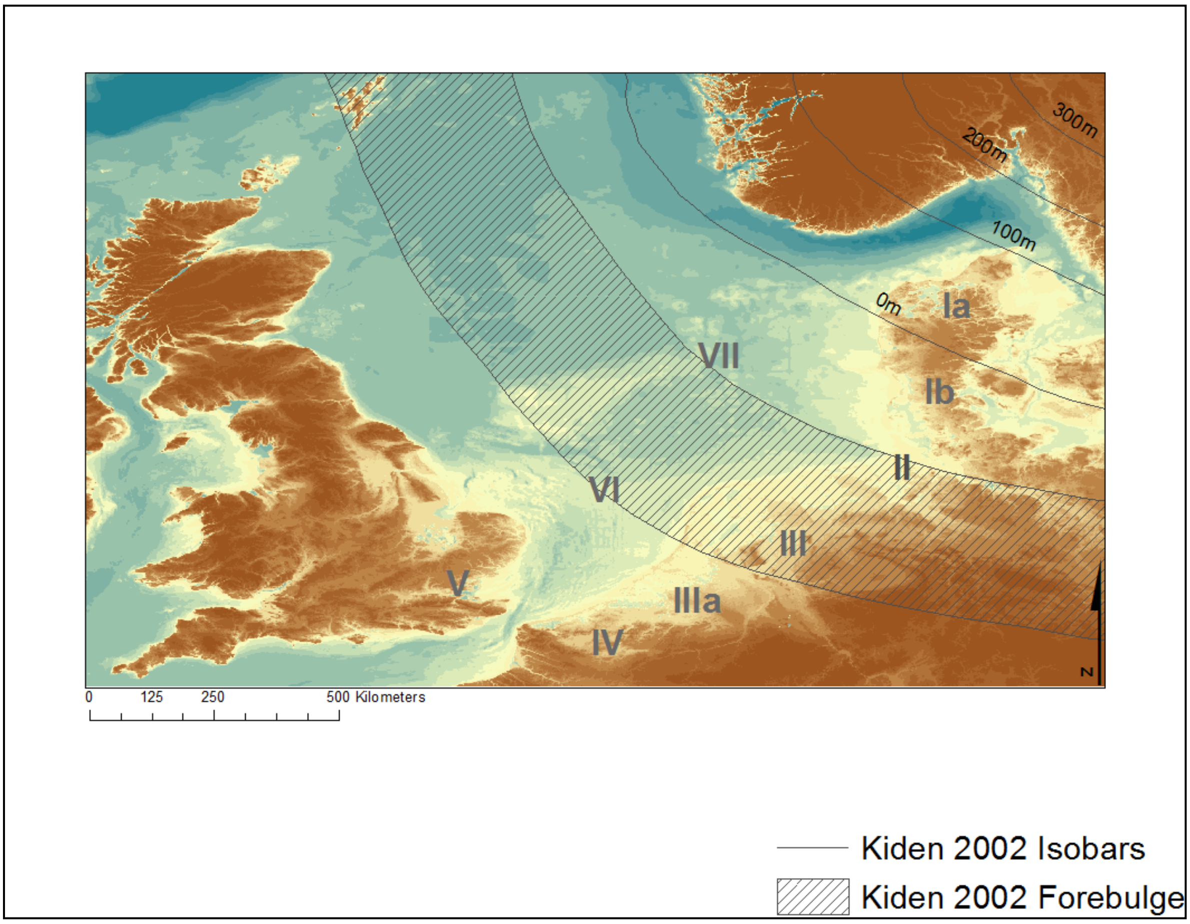


Figure 26. *Following from Kiden (2002), map showing predicted location of glacial fore-bulge and resultant isobars (0m, 100m, 200m, 300m and 400m respectively from fore-bulge) with perpendicular coast of Region III and IV.*

Most isostatic models of this region, therefore, define the area of post-glacial rebound which is surrounded by a subsiding zone (Kiden 2002, 535). The area of greatest post-glacial subsidence, caused by the post-LGM collapse of the glacial forebulge, or peripheral bulge, is situated in the North Sea between Norway and Britain and extends through the North Western Netherlands and coastal Germany (Kiden 2002, 535, Vink 2007, 3249).

The transition region between trending uplift and trending subsidence can also be seen from the RSL curves from the North Sea basin. “The Belgium-western Netherlands coastline of the North Sea is orientated almost perpendicular to the isobases around the Fennoscandian uplift centre, and is therefore optimally located to record post-glacial differential glacio-isostatic movements related to the glacial rebound of Fennoscandia” (Kiden 2002, 536). This optimal recording reinforces the use of an isostatic model to spatially organise research in this region. The Kiden (2002) paper references a model of the LGM ice cover which is now out of date, having been superseded by the understanding of the connectivity between the British and Fennoscandian shields. However, in this region of the North Sea, the newer model of connectivity indicates a similar position for the peripheral forebulge.

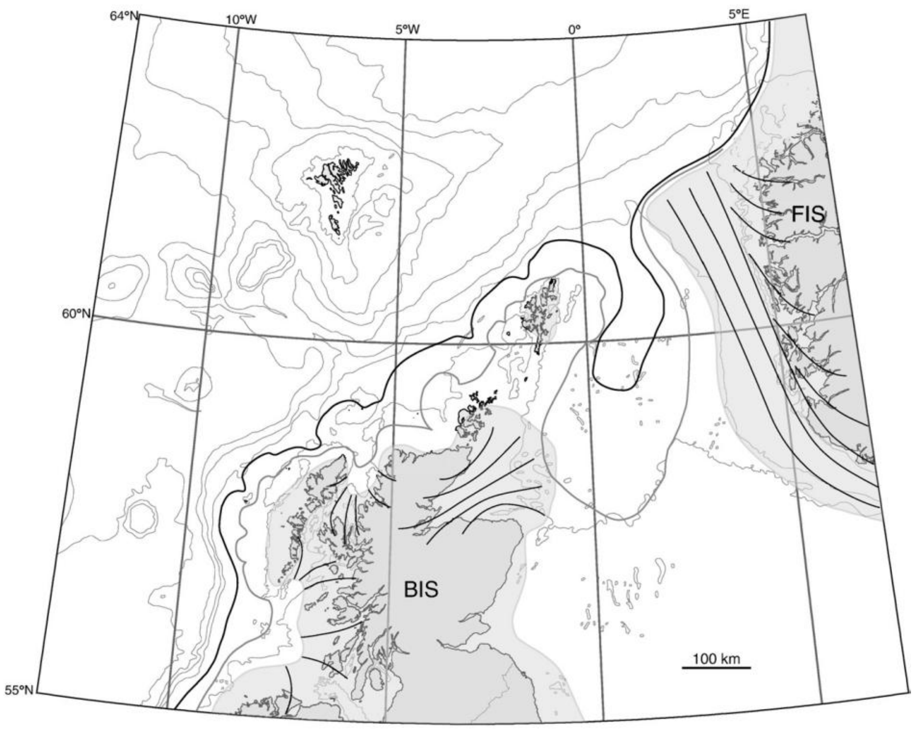


Figure 27. *Model of connectivity between the British and Fennoscandian ice-shields at the LGM* (Bradwell 2008, 223)

Further, this coast is located across the “hinge line between the subsiding North Sea Basin… and the tectonically more stable London-Brabant Massif to the south. Relative crustal movements… are therefore likely to contain both an isostatic and a tectonic component (Kiden 2002, 536).

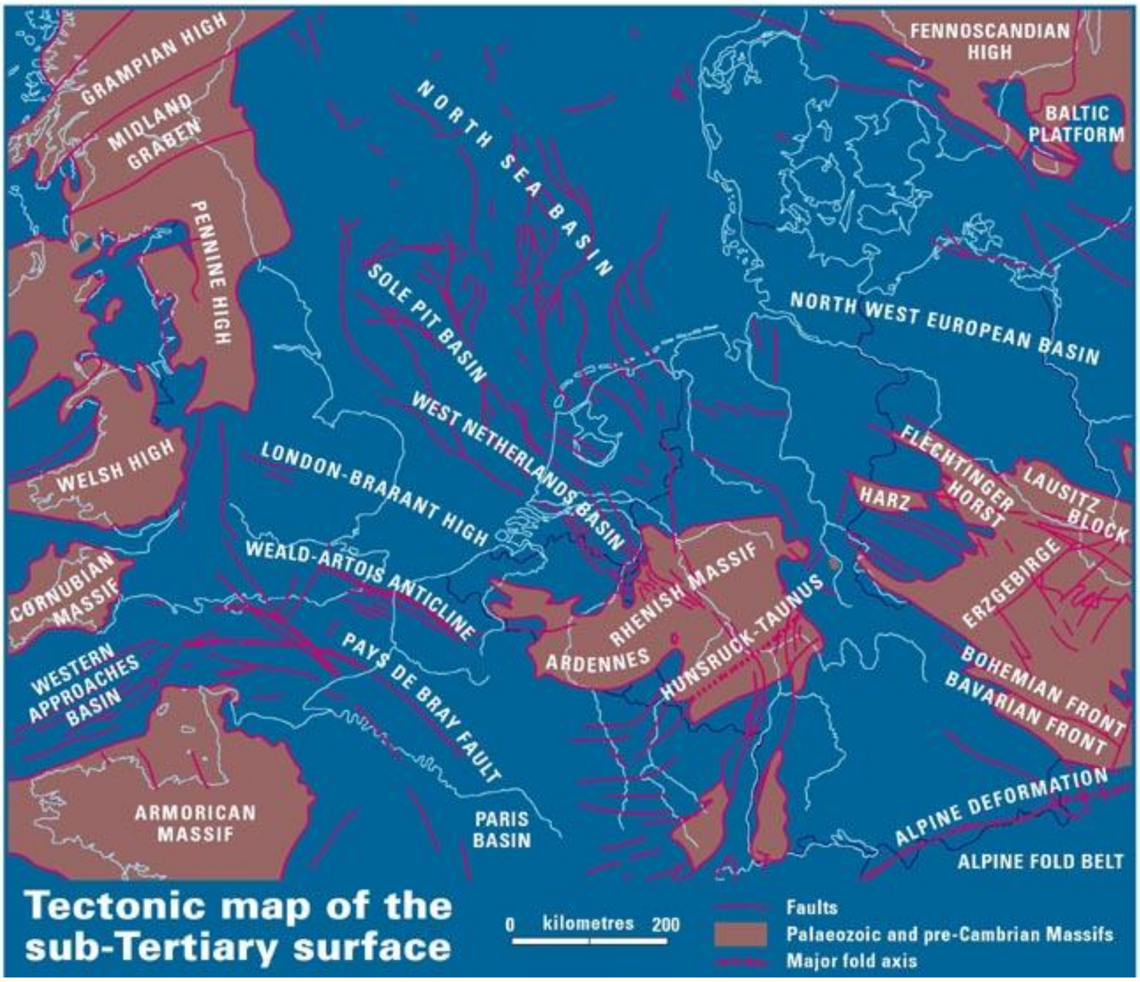


Figure 28. *Map demonstrating position of London-Brabant High* (Gibbard 2007)

In order to examine differential rates of tectonic and isostatic uplift and subsidence throughout the southern North Sea basin, regional and local differences in RSL curves can be used in conjunction with a variety of Earth and ice parameters. These can be applied to model sea and land level changes because isostatic relaxation of the Earth's surface occurs in response to the melting of ice-sheets at "a rate that is governed by the mechanical properties of the Earth, in particular mantle and viscosity and lithosphere thickness" (Vink 2007, 3259). The difference in height between the mean sea-level of two regions in the North Sea basin "reflects the total differential crustal movement between those regions and is… composed of a local/regional tectonic component and an isostatic component" (Vink 2007, 3259). By subtracting the maximum tectonic difference between the two regions from the total differential crustal movement, the minimum isostatic component can be approximated (Vink 2007, 3259). This process has been used to model isostatic subsidence in North West Germany, the Netherlands, and several southern North Sea sites all in relationship to Belgium (Kiden 2002, Vink 2007).

Meso-scale Regions and Archaeology

The regional variations in cultural and environmental patterns will be discussed along the crustal uplift regions defined above. The study area is a geographically contained region which has been seen to have been taken as largely homogenous by macro-scale literature, despite repeated acknowledgment of its 'patchwork' character. Indeed, meso- and micro-scale discussions show the Mesolithic as a prehistoric period particularly demonstrative of spatial differences in the progression of cultural and environmental change which can be seen markedly from North to South, across the forming North Sea and from the coast moving inland. This chapter will identify the spatial and chronological variations and similarities. Through these meso-scale comparisons, the dominant macro-scale generalizations discussed in Chapter Three can be re-evaluated and importantly critiqued in the light of the large body of Mesolithic literature and the new questions being posed within the wider discipline.

Region Ia and Ib

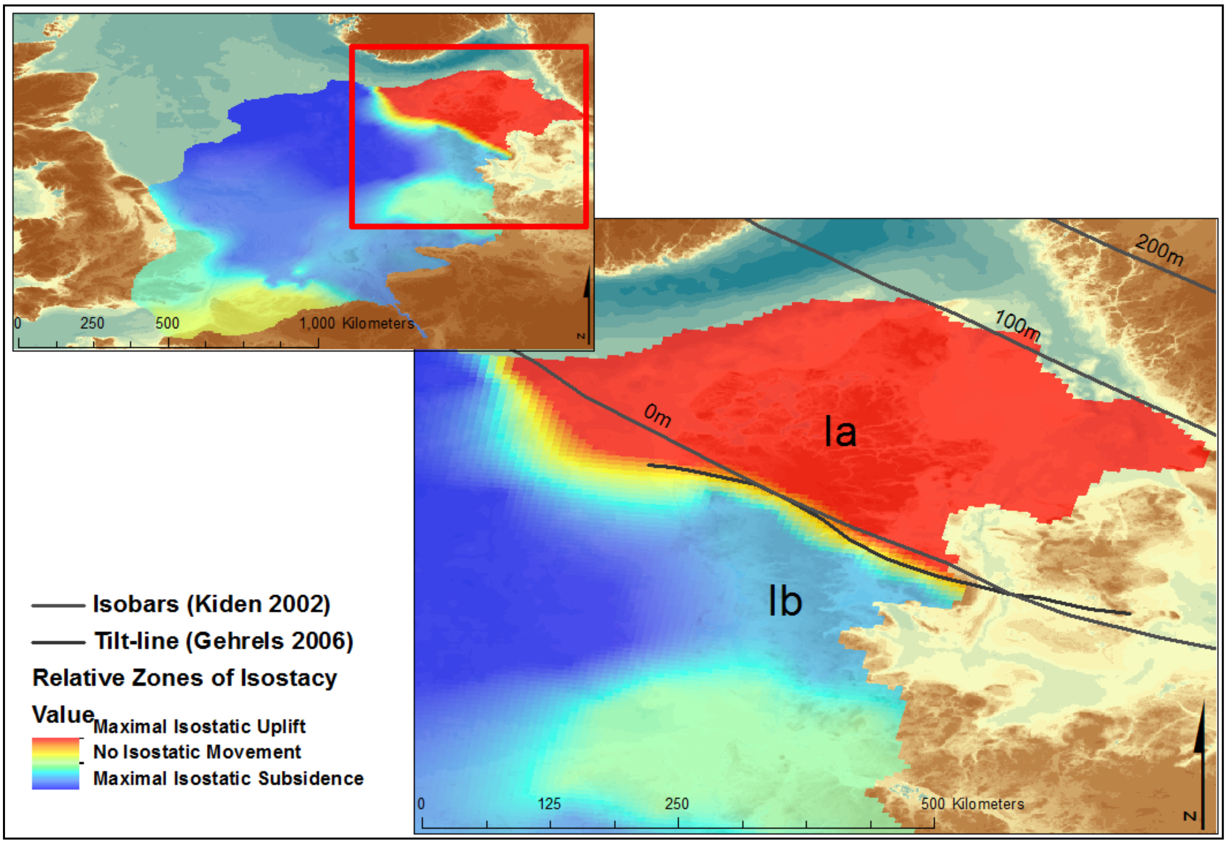


Figure 29. *Region I drawn on GEBCO topo/bathymetry indicating location of axis of tilting uplift/subsidence following Gehrels (2006) and isobars following Kiden (2002)*

In the north of the macro-scale study region, Region I is dominated by a pattern of tilting uplift along a line running from south-east to north-west (Gehrels 2006, 288) from "the island of Falster to the west coast of Jutland south of Limfjorden" (Blankholm 2008, 110). This line is parallel to the isobars, resulting from the collapsed glacial forebulge, as displayed in Figure 29 following from Kiden (2002). The only display of net-rise due to isostatic rebound following the retreat of the Fennoscandian ice-sheet in the southern North Sea is in the north of this area, Region Ia. The image above shows the altitude contours of Holocene marine sediments in the north of this region where they have been uplifted above present sea-level (Gehrels 2006, 289). In the south of this area, Region Ib, below the tilt-line, there has been a net subsidence, leading to the submersion of one of the prominent sites in Mesolithic research, that found at Tybrind Vig (Smart 2003, 44).

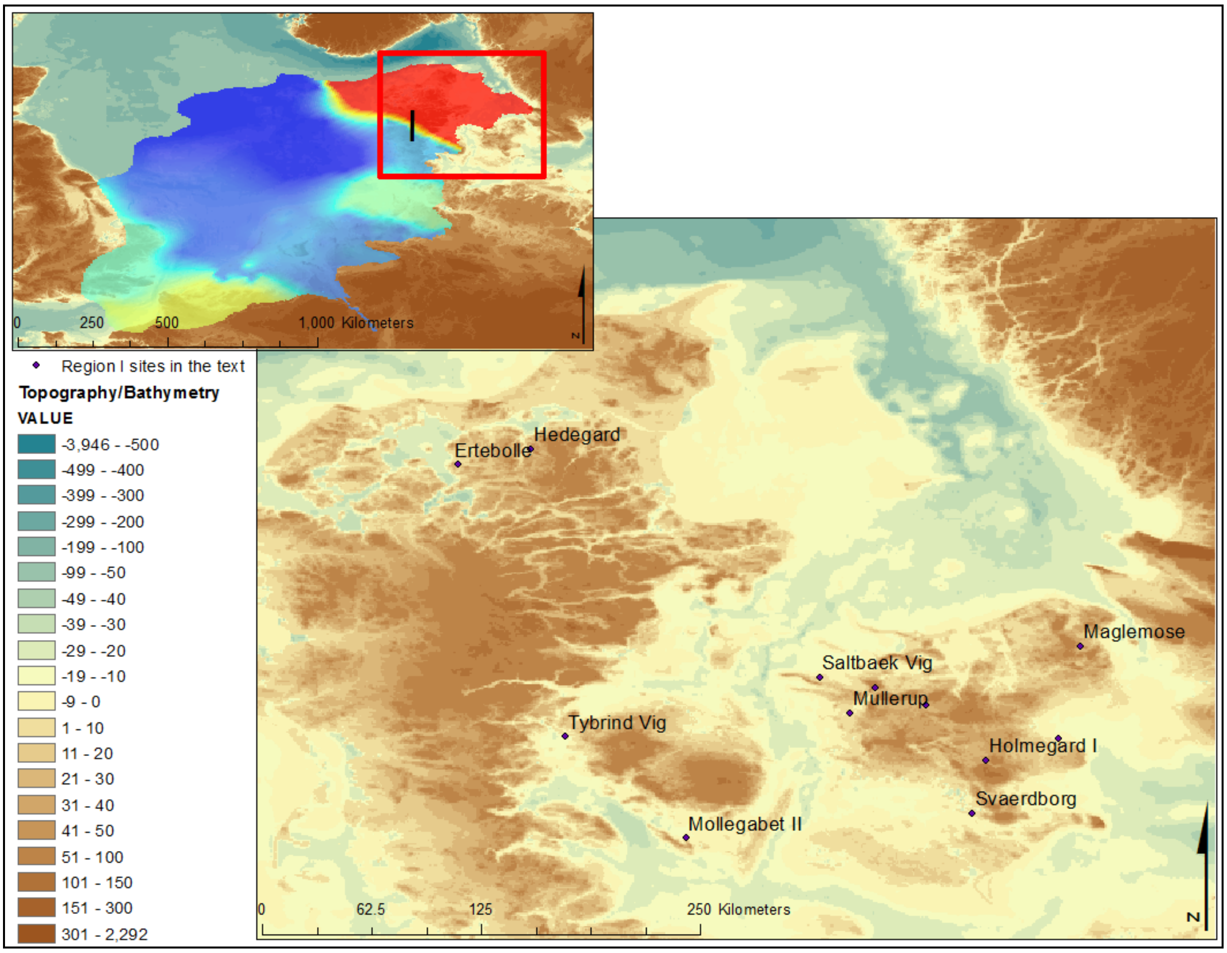


Figure 30. *Region I on GEBCO topography and bathymetry showing location of sites mentioned in text*

By 7500BP, formation of the North Sea had led to substantial inundation and modern coastlines. The proximity of the sea and morphology of the coast has created a marine influenced climate for the entirety of this region, therefore the full extent of this region will be considered 'coastal' for this study. The impact of sea-level rise and inundation on coastal communities and on the vegetation and fauna comprises a large majority of literature from this region, underscoring the importance of these events.

Region I is perhaps most important to Mesolithic research due to the information derived from the type-sites defining the Ertebølle model of cultural progression, and due to the presence of kitchen middens, especially those specific to the final period of the Ertebølle model. The chronology of the Mesolithic in this region is divided into three phases, the latter phase with three sub-phases, and this chronology provides the basis for the classification of Mesolithic sites through much of North West Europe. The three main periods of Mesolithic culture according to this paradigm are: the Maglemose (from ~9,000-7000 cal BC), Kongemose (to ~5,500 cal BC) and Ertebølle (to ~4,500 cal BC) cultures (Andersen 1986).

The Maglemose is characterized, technologically, by its microliths and micro blades, the barbed bone points, decorated equipment and wooden artefacts. Maglemosian communities, specifically from this region, are often used to exemplify the hunter-gatherer-fisher model of prehistoric existence (Blankholm 2008; Smart 2003), though it is suggested that the fishing was primarily in inland waterways (Blankholm 2008, 117). Maglemosian sites vary in size from small, single social unit groups (Svaerdborg II) to large multi-social unit sites with structured settlements (Agerod I; Sorensen 1998). Patterns of seasonal habitation and mobility are interpreted from the lithic distributions and palynology found at these sites (Sorensen 1998, Blankholm 2008).

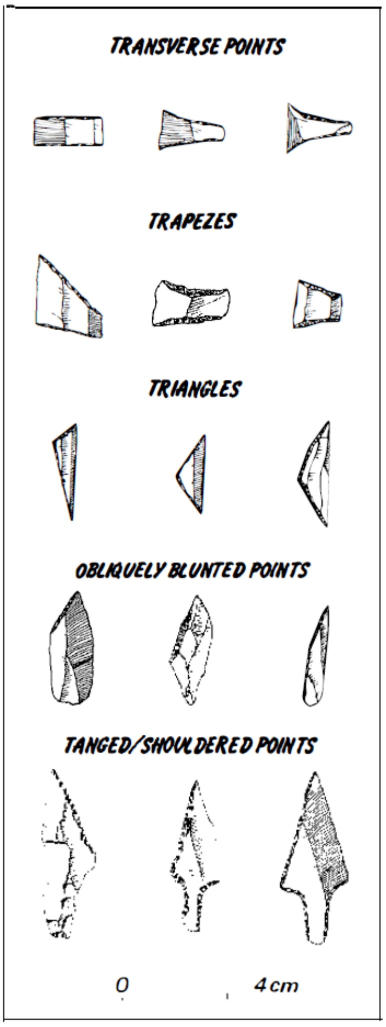


Figure 31. *Lithic tool types from Danish Late Palaeolithic and Mesolithic* (Price 1991, 217)

The Kongemose saw the replacement of microliths with trapezoid and rhombic armatures and core-and-blade technology. Large tools and blades with suspected symbolic as opposed to functional purposes are also found in this period. This period saw the new heavy exploitation of the coastal environment for marine resources. The Kongemose site, however, seems to be mostly comprised of small single-social unit, mobile encampments (Blankholm 2008, 120; Noe-Nygard 1988, 89).

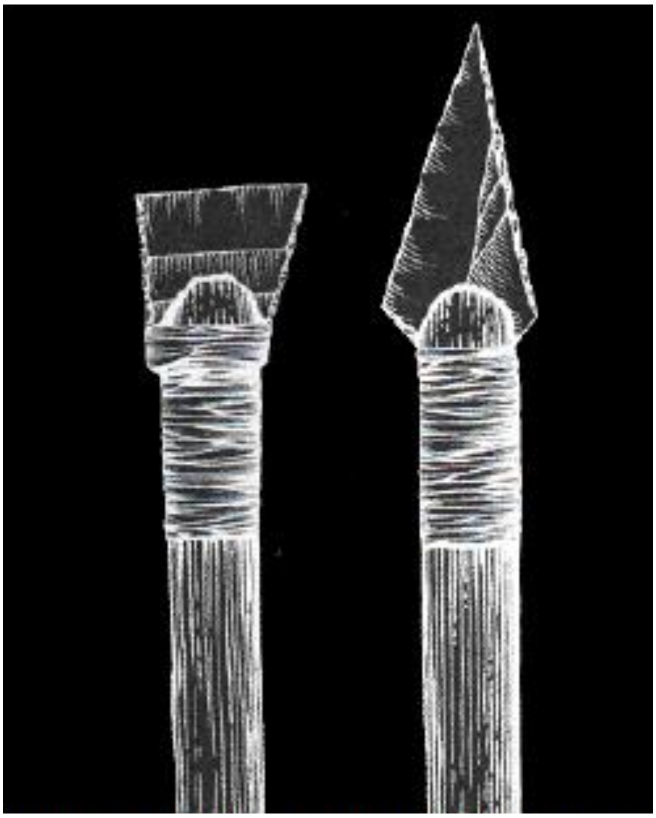
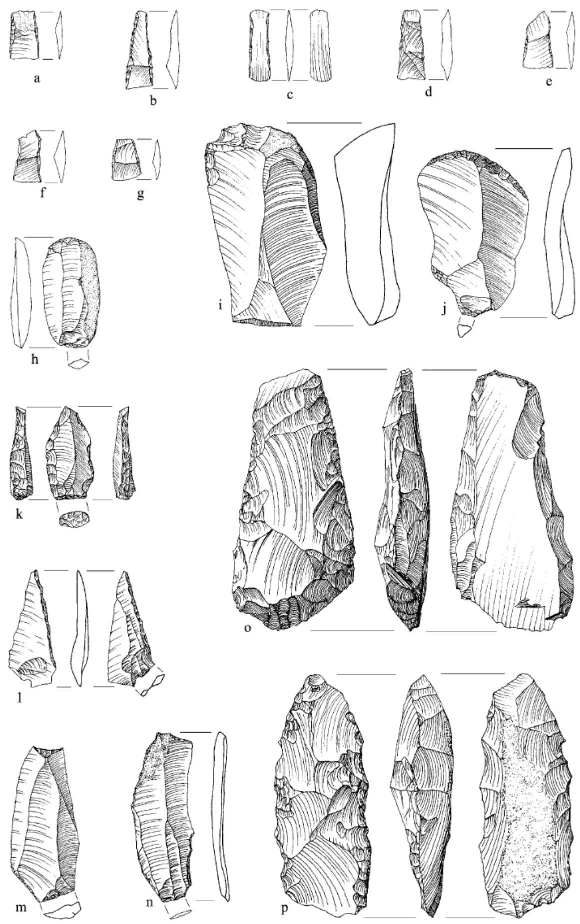


Figure 32. *Kongemosian tool example* (Edinborough 2005, 51)

The Ertebølle artefacts have less of the Kongemosian symbolic signature, though the artefact manufacture retains the high quality begun in the Kongemose, and becomes more standardized (following from Blankholm 2008, 112). This final phase of the Mesolithic is divided into three distinguishable Ertebølle phases. The first characterized by "small oblique points and core axes", the second by "symmetrical, transverse points and concave end scrapers on blades" and the third by "narrow and fully transverse" projectile points and the adoption of "crude, thick-walled pottery" (Gebauer and Price 1990, 260). The Ertebølle as a whole is often defined by its large coastal sites, however, the continued exploitation of terrestrial resources should not be underestimated (Blankholm 2008, 117), nor should the existence of larger Maglemosian and Kongemosian coastal sites be ruled out as, due to the change in coast-line morphology during the Mesolithic, most of these sites are now likely far underwater and away from the current coast. Many of the Ertebølle coastal sites, such as Tybrind Vig and sites on Saltbaek Vig, showed year round habitation indicating a move towards sedentism (Gebauer and Price 1990, 259). The site of Smakkerup Huse, occupied from ~ 5000-3000BC showed occupation throughout the duration of the 5th millennium. It is, though, uncertain how much of this occupation was continuous, year-round occupation or recurrent occupation (Price 2001, 57). This site is important, however, in its Ertebølle evidence for species-specific trapping, large shell middens and both fish and mammal remains. The growing frequency of the presence of kitchen middens over the course of the Mesolithic could also be an indicator of an increasing predilection towards recurrent or continuous occupation as they take hundreds of years to create (Smart 2003, 51).



a. b.

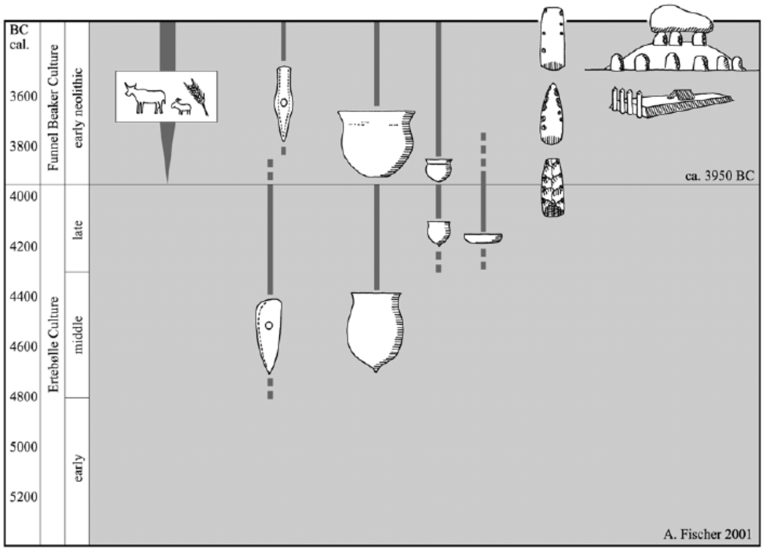


Figure 33 *a) tool types from final Mesolithic: transverse arrowheads (a-g), scrapers (h-j), drills (k-l), truncated blade (m), knife (n), flake axe (o) and unifacially specialised core axe (p). b) innovations from late Mesolithic and early Neolithic* (Fischer 2002, 351 and 383 respectively)

While there are many complexities in the dating of cultural events, especially in the Palaeolithic to Mesolithic transition and further transition to the Neolithic, the dating which has been done for this argues a later cultural progression seen in the northern reaches of the southern North Sea basin. The adoption of both Mesolithic and Neolithic technology and practices occurred up to hundreds of years later in this area, defined by tilting uplift and shell middens, than in the lowlands further to the south of the study region. At Tybrind Vig, the performance of Mesolithic practices, such as the creation of shell middens and the use of earlier tools, is seen to end at ~3800BC, and at Smakkarup Huse, Neolithic artefacts can be dated to ~3900BC. Immediately to the south, Neolithic practices are seen as early as ~4500BC (Price 1991) in the Region II, and ~5500BC in the north of Region III (Gerlach 2006).

The tilting uplift pattern of substantial uplift in the North West and lower uplift and submergence in the southeast has affected the direction of Mesolithic research and the location of sites found in this region. For the Early Mesolithic (10,000–8000 B.P.), interest has focused primarily on the small inland bog sites in the southern part of the area, where the coast has since been submerged due to the lower rate of uplift (e.g. Mullerup, Holmegard I, Svaerdborg). Farther north, where the rates of uplift were, and still are, significantly higher, evidence of coastal settlement has been documented (e.g. Hedegard, Koge Sonakke). The Late Mesolithic (8000–6000 B.P.) is known chiefly on the basis of its large coastal settlements, both those which are currently terrestrial and those which are submerged (e.g. Tybrind Vig and Smakkerup Huse). In this period, there is also a larger and more varied collection of finds, which makes it possible to discern clear regional differences. There has also been considerable research on the transition from Mesolithic to Neolithic in both the north and south (Larsson 2005, 257). A uniting facet of the Mesolithic in Region I, however, appears to be a tendency for sites, regardless of period, to be found "situated where a larger body of water joins the sea" (Mollegabet II, 8; Smakkerup Huse, 47; Tybrind Vig).

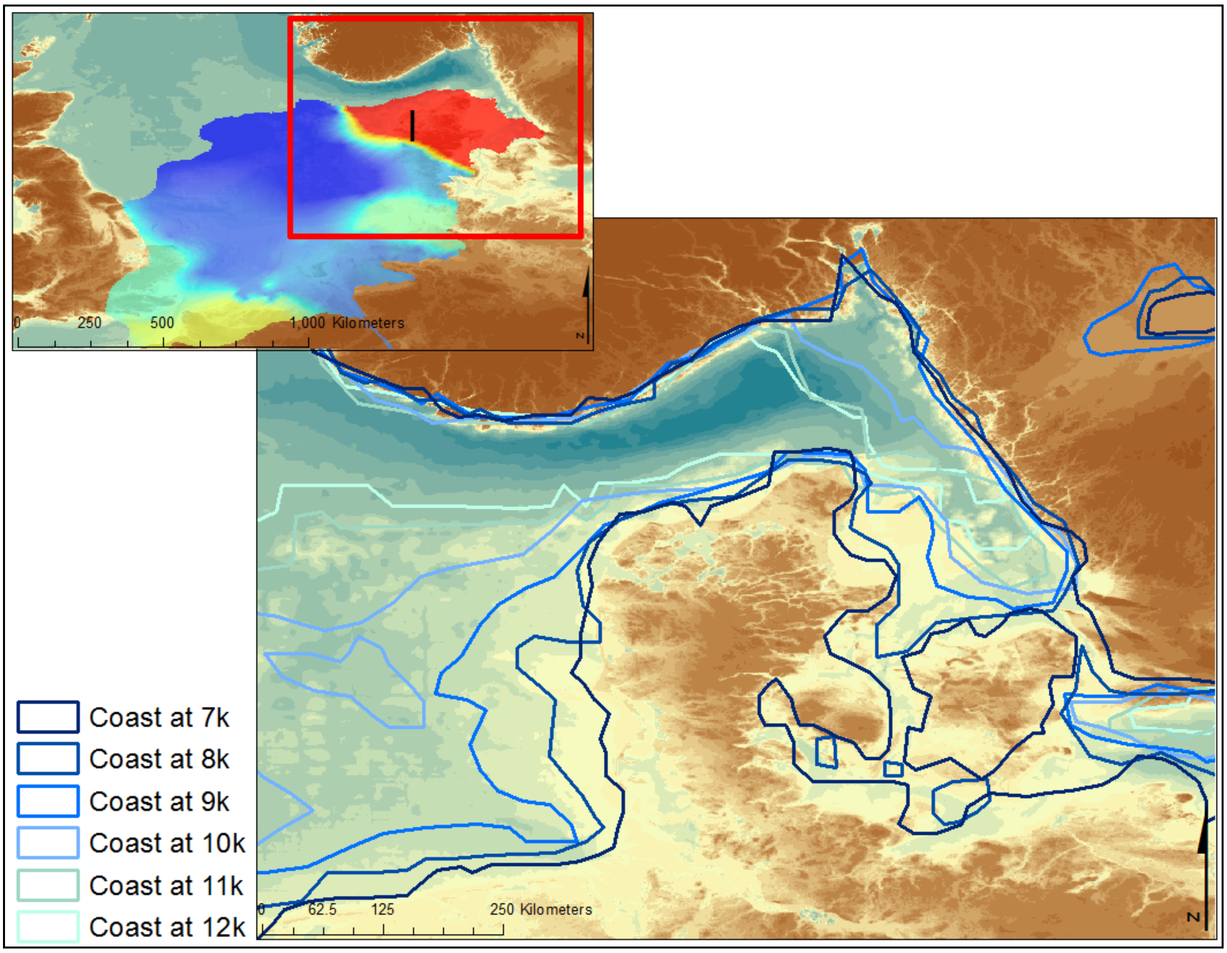


Figure 34. *Map to show inundation of Region I during study period, following POL inundation model, drawn on GEBCO bathymetry*

The first transgression of the sites to the east of this region has been dated to 6400BC, with second and third transgressions at 3900BC – at the Atlantic-Subboreal transition at the end of the Mesolithic – and 3600BC – in the Neolithic (Price 2001, 50). The first, most substantial, transgression changed sea level at a rate of ~30m in 600 years, raising the sea-level vertically at over 1m per generation, where a generation is taken to be approximately 30 years (following from Leary 2011, Gaffney and Fitch 2009), which would have necessitated movement of coastal camps at least twice per lifetime in this region (Smart 2003, 59). The following more minor transgressions are called the Littorina fluctuations and were not regular in space or time.

The high level of preservation and rich history of both excavation and international dissemination of this work throughout the development of Mesolithic archaeology has meant that research from this region has directly fed into the history and current conceptualizations of this field. The Ertebølle model forms the basis for, and in many cases the totality of, our cultural generalizations of the Mesolithic throughout Europe (as presented in Chapter Three). Further, the coastal-locations of key sites from Region I and the artefacts and faunal remains found at them heavily advances the notion of Mesolithic communities as coastal, as having predominantly maritime identities. As seen by the Maritime Research Framework (Adams et al 2011) this is still at the root of our current, most fundamental questions about the essential nature Mesolithic. Perhaps more than through Clark's early work, we can see the derivation of these questions on maritime identity here in the archaeological record for Region I.

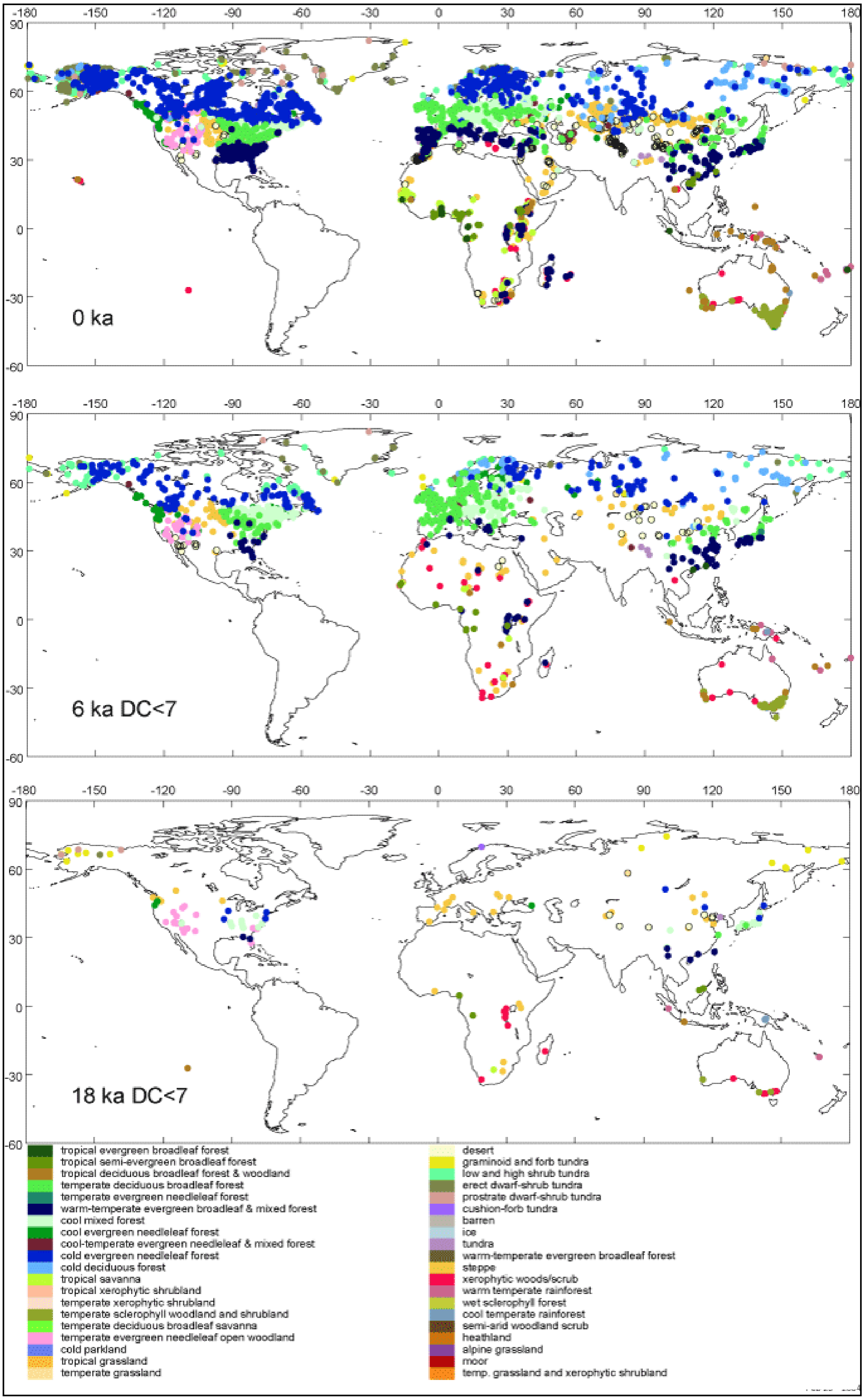


Figure 35. *PMIP II, Palaeovegetation Mapping Project* (Prentice and Webb 1998)

This region is, essentially, where the model for North West European climate change is derived. Tundra vegetation is seen at the end of the Younger Dryas at 11,700BP with low-growing grasses, dwarf birch and willow (Price 1991). This precedes the Early Holocene expansion of birch and pine as the climate begins to ameliorate, followed by the rise of elm, aspen and ash in the pollen records accumulated by Price (1991). As a Boreal Climate begins to dominate, hazel and pine are predominant and the presence of birch begins to decline. Pine decreases with the advent of the Atlantic at ~8000BP as lime, elm, beech and, most importantly, oak enter strongly into the pollen record (Price 1991). The onset of the Subboreal is indicated by the decrease in the elm population but the continuation of a stable mixed deciduous forest for the end of the Mesolithic and beginning of the Neolithic (Price 1991).

Region II

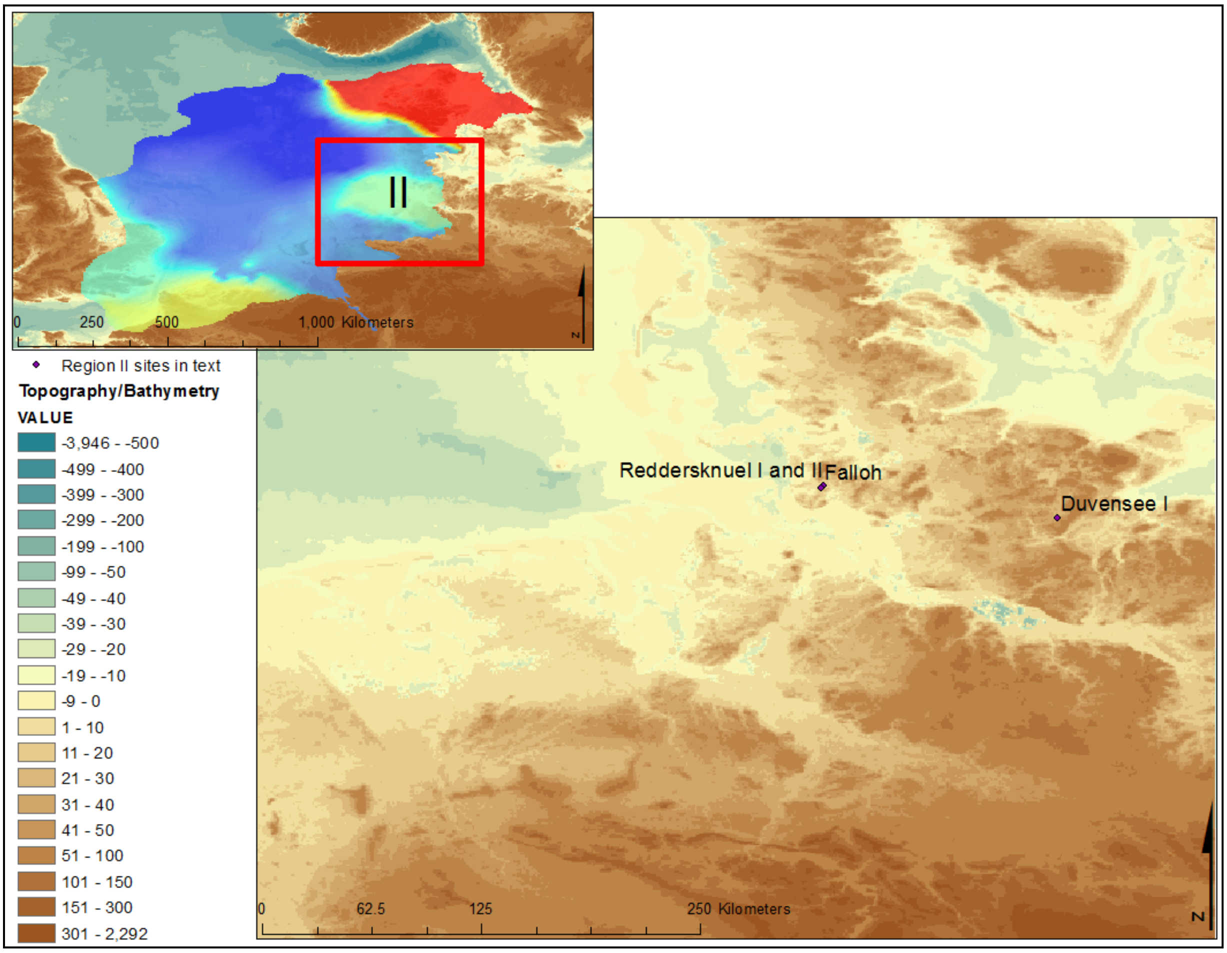


Figure 36. *Map of Region II showing location of sites in text, following from Reiβ (2006, 2008) and Price (1991) drawn on GEBCO topography and bathymetry*

South from the subsidence along the Danish tilt-line, is Region II in the Schleswig-Holstein and northern German region. This area demonstrates reduced subsidence, both isostatic and tectonic (Vink 2007). Rates of tectonic subsidence for this region have been calculated at ~ 0.51m/ka, substantially slower than neighbouring Region III. Region II is characterized by RSL data which plots consistently higher than surrounding regions of more dramatic tectonic and isostatic subsidence, such as the offshore Elbe palaeovalley, Region VII. Region VII comprises the hypothesised (Vink 2007, 3265) centre of the isostatic subsidence caused by the post-glacial collapse of the peripheral fore-bulge. This position of the fore-bulge within the North Sea basin is congruent with understandings of the more northerly axis running through Jutland in Region I, and does not conflict with patterns of crustal movement centred on this tilt-line. The high rates of subsidence in regions VI and VII may have been increased by hydro-isostatic loading, the effects of which have been mitigated in Region II (Vink 2007, 3265).

While no kitchen middens are found south of the region of tilting uplift to the north, the sites of Falloh and Reddersknuell I and II are located within this region, and show clear evidence for human manipulation of the landscape during the Mesolithic. At Falloh, a mid to late Mesolithic site in this region, evidence of human land use and clearance begins in 5200BC (Reiβ et al 2006, 9). At Reddersknuell I and II, human modification of the landscape is hypothesized from 8000-4200BC as indicated by the erosion patterns at these sites (Reiβ et al 2006, 12).

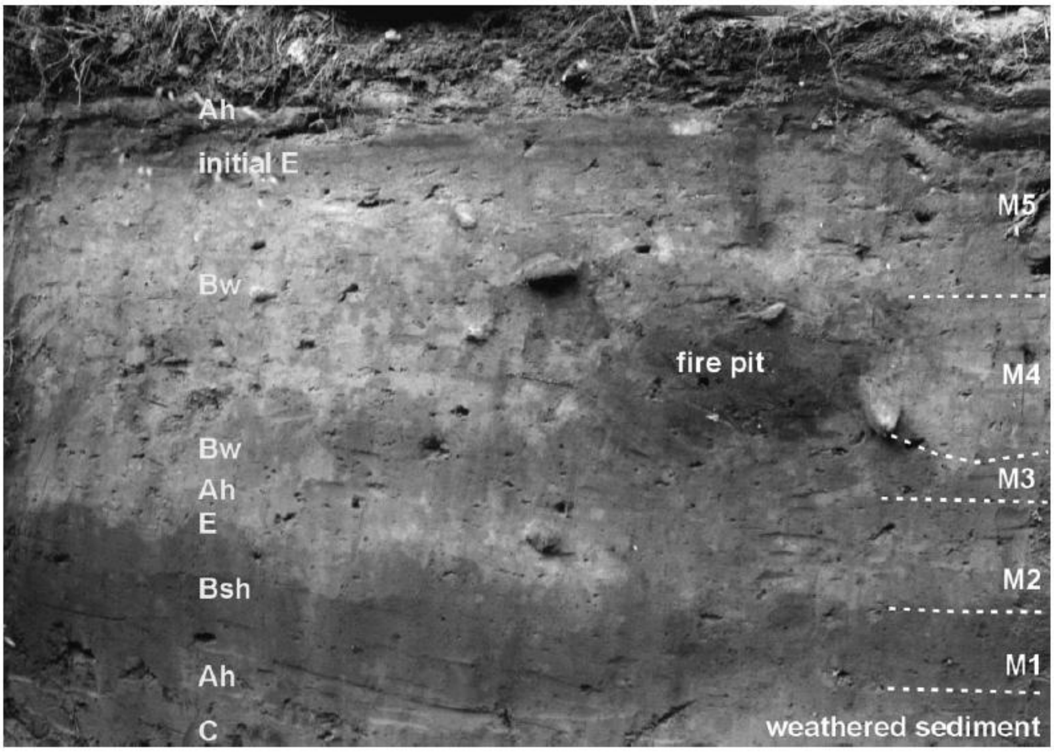


Figure 37. *Example of Mesolithic fire pit seen at Falloh* (Reiβ 2005, 9)

Mesolithic fire pits are seen at both Falloh (Figure 37) and Reddersknuell and date to the estimated transition between late Mesolithic and early Neolithic with charcoal samples at 4712-4535 cal BC and 4723-4534 cal BC (Reiβ 2006, 12). The site of Duvensee I, also in this region, has evidence for a “small autumn camp” from the Maglemosian period with an extensive quantity of charred hazelnut shells (Price 1983, 768).

As indicated by the smaller amount of crustal movement, the early and middle Mesolithic saw a postglacial period of geomorphodynamical stability and the formation of the first Holocene soils, a regosoil under natural forest cover (Reiβ 2006, 12). The later Mesolithic exploitation of the environment led to a thinning in the natural forest cover. The reduced vegetation and heavy precipitation during this period lead to soil erosion and formation of the first colluvium in this area which has preserved charcoal samples dating to 7050-6746BP. However, whether this sample is from a Mesolithic fire pit or a natural fire is as of yet to be determined. Mixed forest vegetation developed on the colluvium and surrounding forming cambisol (Reiβ 2006, 14)

The earliest brackish-water incursion into this region occurred at around 10,000BP when sea-level was ~65m below present. Fully marine conditions took hold after 7000BP. The phase of continuous sea-level rise between 8600 and 7100 cal BP took place at a rate of 2m per every 100 radiocarbon years. The subsequent phase of steady sea-level rise began at 7500BP and continues today at <11cm per century (Gerdes & Watermann 2003, 424). Continuous deposition of transgression-characteristic sediments is seen in this region from 9000 to 6000 years BP with an onset of marine sedimentation at 8000 years BP onwards when the North Sea rose above -20m (Gerdes & Watermann 2003, 429). Landward-directed pulses of sea water driven by storm floods also had large impacts on the environment in this region, as can be seen from "accumulation of pelagic marine diatoms and clay intercalations between peat formations… salt water became mixed with terrestrial freshwater runoff. More than today, the mixing zone may have been extensive and reached far into the low hinterland due to… the compaction of the organic and clayey sediments" (Gerdes & Watermann 2003, 431). This would have constantly shaped not only the morphology of the Mesolithic coastline in this region, but also the daily rhythms of this coastal zone, driving their immediate effects farther inland and making them a strongly dominant component of Mesolithic life and perception of the environment.

Region III

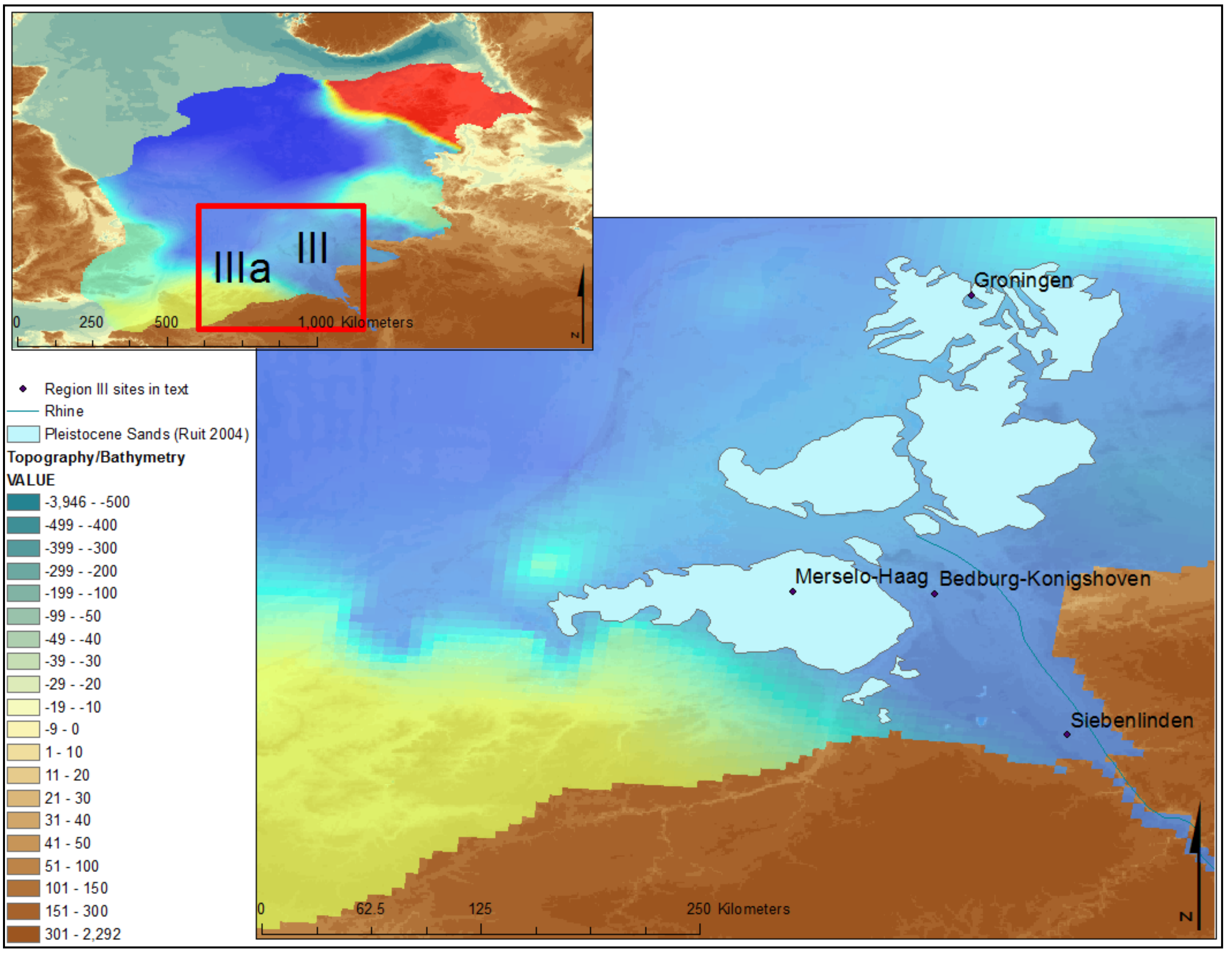


Figure 38. *Map of Region III and IIIa displaying sites mentioned in text, the landscape covered by Pleistocene sandy sediment, and the valley of the River Rhine before it opens into the coastal lowlands, drawn on GEBCO topography/bathymetry.*

The region of highest tectonic and isostatic subsidence on the current coastline of North West Europe is further to the south, in Region III. Tectonic subsidence for the north and west of this regions has been estimated at 0.15 m/ka and 0.08 m/ka, respectively (Vink 2007, 3262). However, the difference in RSL between this region and those to the north and south are not compensated for by the regional variations in tectonic rates, therefore, the largest component of this difference is isostatic, likely due to proximity to the centre of the fore-bulge collapse. The RSL curves from this region plot consistently below those from Region IV and the amount of glacio-hydro-isostatic subsidence decreases strongly in a southerly direction (Kiden 2002, 544). Prior to ca 7 cal k BP, subtraction of the maximum tectonic component from the total differential crustal movement between Region IV and, particularly the west of, Region III shows that Region III and Region VII underwent a considerable isostatic subsidence relative to Region IV during the early Holocene (Kiden 2002, Vink 2007). After 7,000 cal BP, however, Vink (2007, 3263) has shown a reduced difference between rates of subsidence between the III and IV. This lends strength to the decision to close the boundary on the chronological range of this study prior to 7,000 cal BP, as discussed in Chapter Two. Off-shore from this region of maximal coastal subsidence, in Region VI, however, there is only slightly larger than the coastal rates (Kiden 2002, 544), as compared to the rates of subsidence further north in Region VII as seen by Vink (2007). This north-westerly trend in increase subsidence is attributed to hydro-isostacy, while the north-easterly trend is hypothesised to be due to glacio-isostatics.

The coastal area of Zeeland in the south of Region III, occupies an intermediate position between the subsided landscape of the north and west of Region III, and the comparatively resistant landscape of Region IV, which has seen low rates of either isostatic or tectonic (0.008 m/ka (Vink 2007, 3262). Holocene regional sea-level data from this region, thus display an intermediate amount of subsidence in this transitional region.

Region III is divided into the archaeology of the Rhine Valley in the inland reaches and the coastal lowlands. As the coastal lowlands in Region IIIa, are archaeologically more similar to Region III than to Region IV, it has been included in this discussion. The region further inland from the Rhine Valley, to the interior of regions II and II, has been discussed at length in the body of Mesolithic literature (Bos 2003, Street 2001, Joachim 1998, Price 1983). This higher, loess-covered landscape has a different geomorphology and different vegetation, as evidenced by the pollen record, than the Lower Rhine valley. These sites were more resistant to the effects of the formation of the North Sea basin, and thus are not included in the coastal focus of this study.

Region III - Rhine Valley

The Rhine Valley is comprised of the Higher, Middle and Lower Terrace. This lower Rhine Terrace is the focus of most Mesolithic coastal research as further inland, to the east, the higher terraces are outside the influence of Holocene sea-level change (Kasse et al 2005, 378). The Lower Rhine Basin was formed at the beginning of the Tertiary during several transgressions of the North Sea, which deposited fluvial gravels. It is divided into the younger and older parts; the younger is characterized by Laacher See tephra (Behling and Street 1999, 274) which, in this region, is often used to underpin relative chronologies. Central-west Germany, south of the Lower Rhine Valley and inland from the southern coastal environment of this region, is a loess-covered landscape in contrast to the sandy Holocene floodplain (Gerlach 2006, 38). Both of these landscapes show the occurrence of Luvic Phaeozems which, in the Lower Rhine Basin, are thought to be relics of the Early Holocene (Gerlach 2006, 39).

Mesolithic tools at Bedburg-Konigshoven, an important early Mesolithic site (~9780BP) in this region, are made predominately from Cretaceous flint, most of which is local to the site. This collection shows large blades, possibly with a ceremonial or symbolic purpose similar to those large blades found to the north of the southern North Sea basin. These are typical of blades found in this region (Behling & Street 1999, 282). Early Mesolithic sites at Siebenlinden, show open air settlements, surface hearths and several distinguishable areas of activity (Kind 2006, 153). This site has also produced a range of early, middle and late Mesolithic material, divided into the German Mesolithic categorizations as shown in the Chronology table at the start of this section. The sites with occupation from the mid-Boreal at ~8700BP show residential settlements as opposed to discrete camp sites, while the later mid-Atlantic sites show less intensive occupation (Kind 2006, 154). There is increasing evidence from the archaeobotanical record for the use of fire as a management tool by Mesolithic communities in this region. Periodic accumulations of charcoal in the Lower Rhine Basin Mesolithic pollen profiles indicate that fire-management may have been typical for Rhine valley Mesolithic communities (Gerlach 2006, 49).

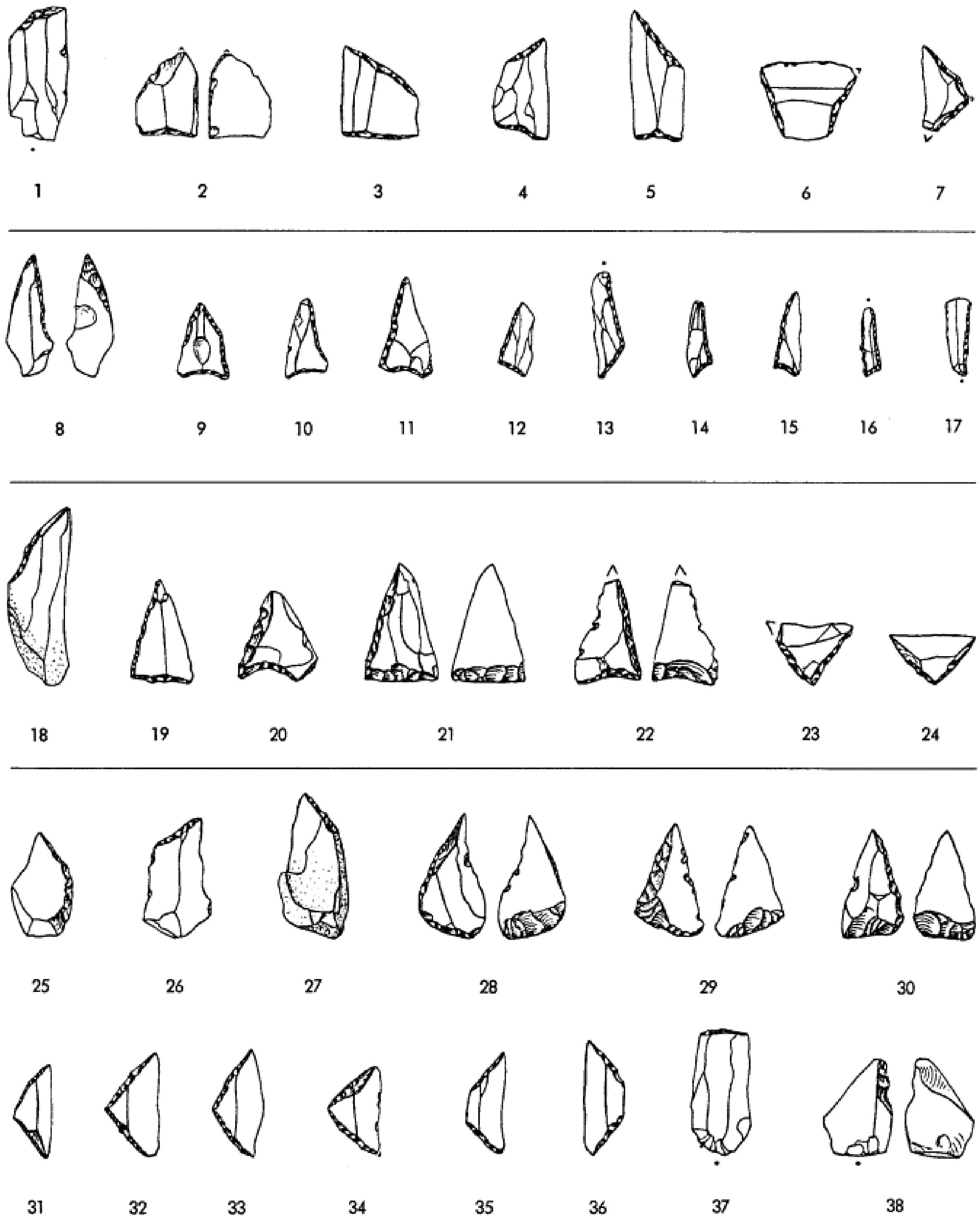


Figure 39. *Tool Typologies from Mesolithic Rhine Valley site of Siebenlinden; 38–25, Beuronian A; 24–18, Beuronian B; 17–8, Beuronian C; 7–1, Late Mesolithic* (Kind 2006, 215)

One indicator of the difference between coastal and inland environments in this region is the timing of the immigration of *Pinus.* Inland and to the south of this region, such as in the Wettterau, pine is seen early, in the Late Glacial, and quickly becomes a dominant species in the pollen record. Towards the coast in the north of this region, especially, the immigration of pine occurs later in the Allerød, nearer the time when it begins to be seen in the pollen records of the lowlands to the south (following Bos 2003, 194). This suggests, possibly that the Rhine river served as a migration route for plant taxa.

Vegetation change in this region of the southern North Sea basin is well documented. The coastal environment of this region in the cool Younger Dryas period is indicated by a dominance of *Pinus* and *Betula,* the former of which decreases from 85% to 35% and the latter of which increases during this phase. A relatively high percentage of *Salix, Juniperus* and open-vegetation species indicates, as further north, a Tundra environment (Behling & Street 1999, 276).

The Preboreal of this region is split into three phases, the Rammelbeek from 9.9-9.7k 14C year BP in which *Betula* declines overall and *Pinus* increases from 35% to 65%, the middle Preboreal sees the reverse in which *Betula* increases and *Pinus* decreases, and the final Preboreal in which *Betula* decreases and *Pinus* increases again at 9500 uncal BP (Kind 2006, 155; Behling & Street 1999, 278). The decrease in the values of *Juniperus* and *Salix*, and the final increase of *Pinus* and decline of *Betula* indicate the Pleistocene-Holocene transition and the mixed woodland taking over from the former open landscape. "Single pollen grains of *Quercus* and *Viburnum* indicated that the expansion of thermophilous trees and shrubs began during the Preboreal (Behling & Street 1999, 277).

The Boreal vegetation is dominated by Hazel within the spreading woodland. *Pinus* retreats as *Ulmus* and *Quercus* expand, followed by *Tilia* and *Fraxinus,* both indicators of the warming climate. The intersection of the decline in *Pinus* and increase in "mixed oak woodland taxa" indicates the end of the Boreal woodland and beginning of the Atlantic phase at ~8000 uncal BP (Behling & Street 1999, 281).

The Atlantic period is denoted by the dominance of *Quercus* and *Ulmus* in a mixed woodland with inclusions of *Tilia. Pinus* carries along at ~20% while *Corylus* is of increasing importance at 50%. The decline of *Ulmus* and increase of *Tilia* percentages indicate the end of the Atlantic and advent of the Subboreal at the end of the Mesolithic and early Neolithic.

Region III – Coastal Lowlands

The region of greatest coastal subsidence in the current North Sea basin is below the Rhine mouth in Region III. The early and mid Holocene sea-level data from this region plots ~2m below data from the coastal regions to the north and south (Kiden 2002). The isostatic component of this uplift reflects both the final collapse of a peripheral bulge beneath this region and the hydroisostatic subsidence of the North Sea basin caused by water loading as the sea-level rose. The spatial distribution of this subsidence is highly variable, yet significantly greater for this region than those to the north and south. The data extending back to ~9000 cal BP plot consistently under neighbouring sea-level curves (Kiden et al 2002, 535-536). The following discussions will include the area of Zeeland, Region IIIa, to the south of this region, which is a transitional region between the lowlands and the higher cover-sand region to the south. The vegetation and archaeology of this region is similar to that of this low-lying region of greatest subsidence. The distribution of Mesolithic sites within this depression is a result of two distinct geologies in this region (Groenendijk 2004, 137). In the south and east, there are continuous Pleistocene cover-sands whereas to the north and west existed a thick peat layer which has been exploited since ~1600AD, relatively recently exposing an Early Holocene cover-sand landscape, drowned in the course of the Mesolithic (Groenendijk 2004, 139). The variation of drier dunes and wet biotopes in this region attracted Mesolithic foragers in the Boreal and Atlantic, however, a large proportion of known Mesolithic sites were, until recently, located in the south-eastern Pleistocene sands as these offered the most accessible finds (Groenendijk 2004). Especially in this region, where Mesolithic communities did little digging (Verhart 2008, 160) other than of pit-hearths, surface finds in this area were easy to come by. The subsoil of both areas consists mainly of fluvial sediments from the Rhine/Maas/Meuse which formed terraces during the Quaternary (Hoek 2000, 500), though there is some north-south patterning of sand in the north to loess in the south due to along-track sorting by northerly winds picking up sediment as they crossed the Rhine Valley.

The early Mesolithic in this region is in many ways indistinct from the Upper Palaeolithic. The flint industry is closely akin to that of the Ahrensburgian period at the end of the Palaeolithic with a lack of tanged points characteristic of the earlier period and with an increase in microlithisation as seen at the start of the Mesolithic further north, as well

(Verhart 2008, 165). There is less evidence for organic material culture in this region than in others further north in the southern North Sea basin, though this could be due to the submergence of these artefacts and differential preservation. The introduction of projectile points with surface retouch signifies movement into the mid-Mesolithic of this region (Verhart 2008, 165). In general, however, less is known about the middle Mesolithic in the low-lands. A distinct movement from inland sites to more open coastal areas is seen after 8700 BP as the change in vegetation choked access to inland waterways (Bos 2005). The late Mesolithic in this region is indicated by broad and narrow trapezes which are seen markedly earlier here (6500 cal BC) than further north (6200 cal BC) (Verhart 2008, 172). Flake axes are frequently seen, however, organic material tools are still rare. A recent find of an antler axe sleeve with decoration might indicate that these were used much more frequently than indicated by the archaeological record (Louwe Kooijmans 2003). Similarly to indications in the region further north, centred around Lower Rhine Terrace occupations, though perhaps more dramatically indicated, Verhart (2003, 177-178) has seen the reduction of the size and duration of inhabitation at sites from the earlier Mesolithic to the later Mesolithic. He notes this at the site at Merselo-Haag. A similar development is noted by Groenendijk (2004) who saw that the Middle to Late Mesolithic site at Groningen was not, as first thought, a residential camp or an aggregation camp, but was an accumulation of small events; repeated visits to a camp site. This is counter to the expected cultural progression and challenges the Ertebølle model.

This peat-rich region of the lowest-lying terrestrial area of the southern North Sea region is also defined by the existence of hearth pits showing varying depths which have been attributed to the varying height of the groundwater table during the Mesolithic. The Pleistocene sands, however, show a greater dominance of surface finds and surface hearths. Climate change not only brought this formerly hinterland region to the coastal margin, but had vast impacts on the groundwater depth, drainage and vegetation of this region.

The effect of sea-level change at the end of the LGM was minimal, due to the distance from the coast at this point. However, within 2000 years from 9200-7000 cal BC (9600-8000BP), this low-lying area became a coastal environment (Verhart 2008, 159). The wetland environment began increasing at the beginning of the late Dryas, which may have led to a diminishing of the existing pine forest (Hoek 1997, 1904). This raised the ground water table, created ponding and led to the formation of peat, which was to cover a substantial part of this region for the next 5-7000 years. The infilling of the Rhine and Meuse river channels with peat and gyttja in response to this increase in ground water is dated to 9800-8000BP (Berendsen 2000, 340) showing the rapidity with which this environment changed.

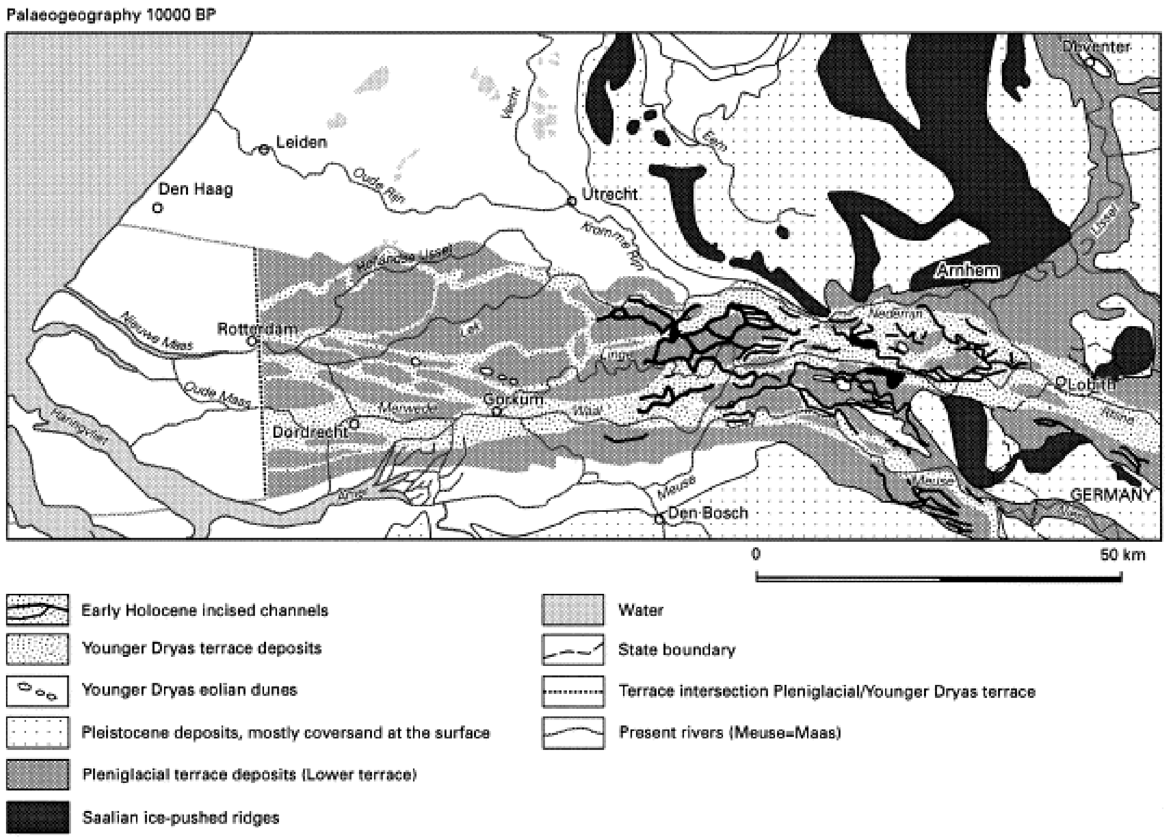


Figure 40. *Palaeogeography from ~10,000BP showing Rhine/Meuse/Maas valley which became infilled with peat during the early Holocene* (Berendsen 2000, 321)

The final Younger Dryas, just at the onset of the North Sea inundation, was characterized by an open herbaceous vegetation dominated by Poaceae (Bos 2005a, Bos 2005b, Bohncke 2007). The onset of the Early Holocene Friesland phase at the start of the Preboreal showed an increase in *Betula*, *Populus*, *Pinus* and *Juniperus* and a diminishment of herbs. Poaceae, however, continued to increase from 10% to 25% (Bohncke 2007). The Rammelbeek phase showed a diminishing in *Betula* and a further increase in Poaceae and *Artemisia*. In the late Preboreal, from 9470BP, *Betula* was somewhat restored, though *Pinus* percentages dominated at 40% and Poaceae and *Artemesia* declined (Bohncke 2007; Bos 2005a). The early Boreal, 10,710 cal BP-10,000 cal BP is indicated by the onset of *Quercus* and *Ulmus* and the decline of *Pinus*. While the Atlantic is indicated by mixed deciduous forests with an uncharacteristic lack of *Tilia,* and eventually the decline of *Ulmus* percentages (Bos 2005b).

The archaeology from Region III in many ways contradicts the traditionally-established conceptualizations of the Mesolithic and of Mesolithic research. The cultural progressions of tool typologies, interpreted mobility and site size and distribution run counter to the Ertebølle paradigm, as will be discussed further below. However, studies from this region also further confuse what is expressed by the term ‘site’. With the open and uncovered landscape throughout much of Region III, due either to the specific geology of this region or due to peat removal, exposing the underlying palaeolandscape, the archaeology of this region is far more accessible than, for instance, throughout Regions I and V where excavation can only provide key-hole insights. Therefore a site, in this region, is more expansive and incorporates a larger range of data input than in those regions where information is much less accessible. This complicates debates of the appropriate epistemological scale between researchers from different countries as the same language can refer to very different approaches. The more landscape-orientated site seen in this region promotes a more integrated approach between data sources and types which is in better keeping with the current goals of Mesolithic archaeology.

Region IV

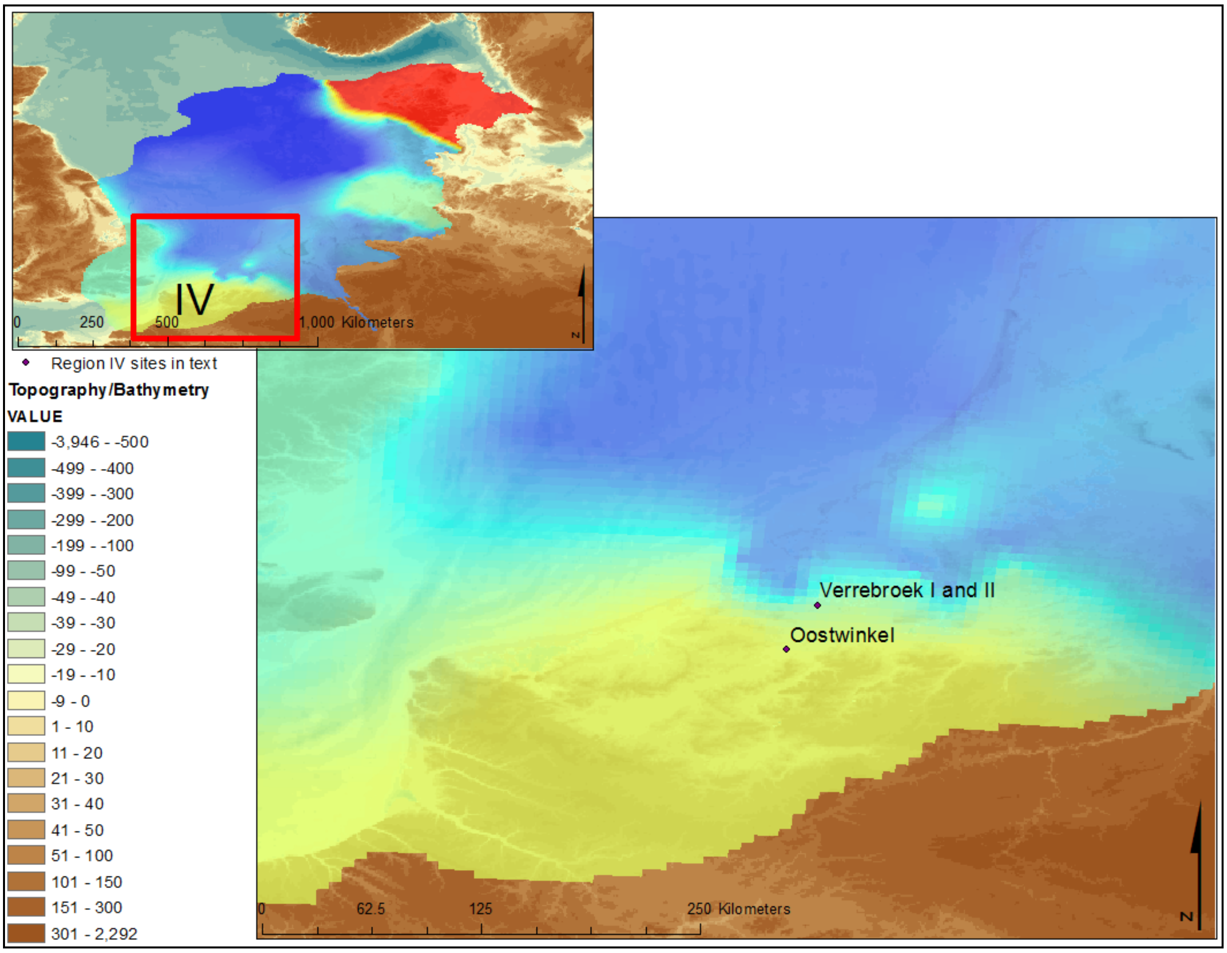


Figure 41. *Region IV with sites mentioned in text drawn on GEBCO topography/bathymetry*

Further south from the Region III lowlands is the higher landscape of the sites such Verrebroek Dok 1 and 2, and Oostwinkel. This tectonically and isostatically more stable region has not experienced the subsidence of regions further north. The cover-sands in this region also show a high frequency of Mesolithic surface hearths (Sergant et al 2006).

This region is predominately Late-Glacial cover-sand with occasional interspersed peat and clay covering the Mesolithic surface, such as at the site of Verrebroek Dok. This organic covering is likely the reason for the exemplary preservation at this site, though it did not begin to form until 3780-3100 cal BC at the earliest, therefore, no organic material culture has survived from the Mesolithic in this region. Verrebroek Dok is located in the north of this region, near to the current coastline. The northern part of this sandy region is formed into a “well-developed pattern of sinuous depressions and rather wide, low sand ridges” (Crombe 2004, 11). In the north of this region is a pronounced ridge, running east to west, on which is situated the site of Verrebroek Dok. Inland from this region, is the archaeology continuing from the Lower Rhine Valley discussed above, in the inland valley of the Rhine/Meuse river system.

The start of the Holocene is demarked by a clear shift in the settlement system of this region. As the large lakes of the Younger Dryas dried and became unsuitable to support habitation, former prehistoric sites became disused and Early Mesolithic settlements are found often on the borders of the Kale River, near Verrebroek Dok. However, the size and site-density of settlements shows little change between the Upper Palaeolithic and start of the Mesolithic (Crombe 2004, 11).

The artefact concentrations at Verrebroek Dok indicate the remains of former habitation and activity centres organized around a central fireplace. The main occupation occurred from 9500BP to 8500BP, corresponding to the second half of the Preboreal and first half of the Boreal. The tool types found within these sites are in agreement with this dating of the occupation (Crombe 2004, 12).

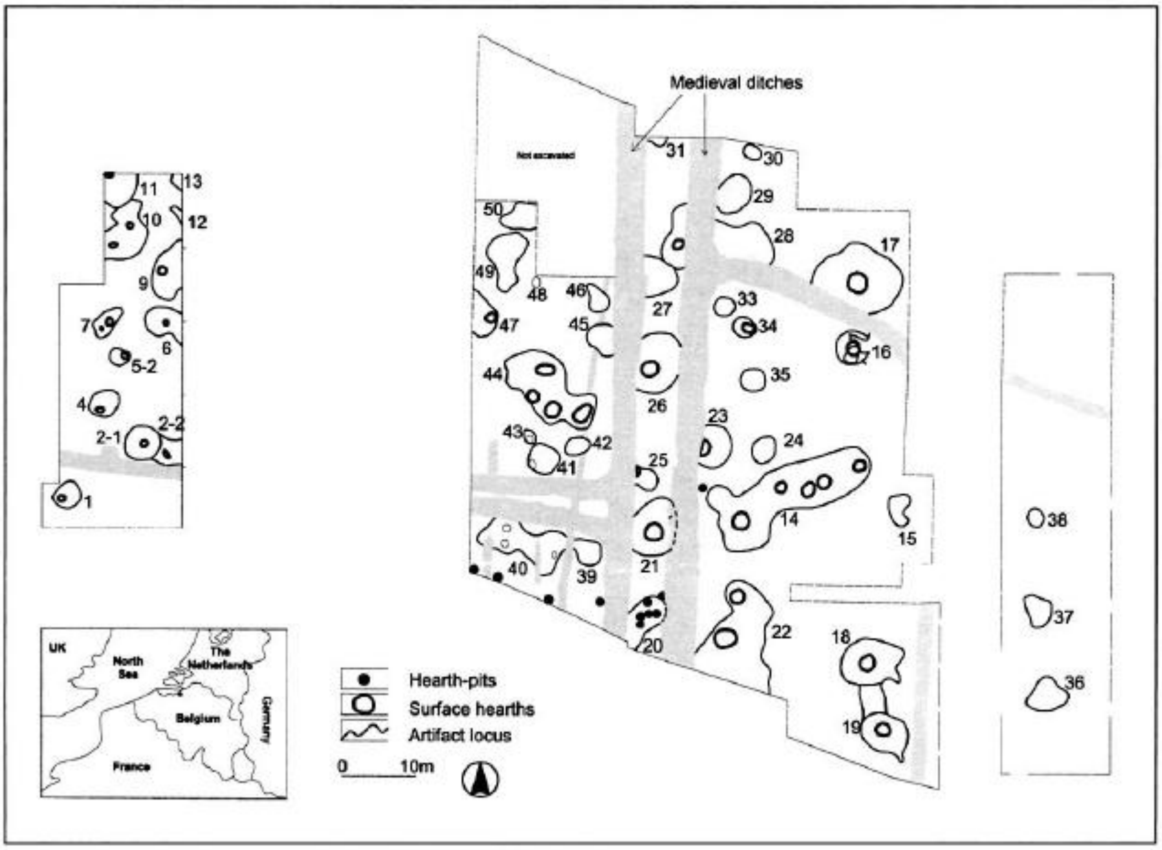


Figure 42. *Location of hearth-pits, surface hearths and surrounding artefact scatters from Verrebroek Dok 1* (Crombe 2001, 256)

The central hearths, demarcating the structure of habitation, are indicated by high percentages of surface-scattered flints in opposition to the pit-hearths of the depressed region to the north (Sergant 2006, 1001). It is commonly assumed that surface hearths were used for preparing all of the food-types for Mesolithic communities. However, beyond the expected charred remains of hazelnuts, many artefact types, including lithic material and bones were thrown into the hearth once it was nearly extinguished. It is possible, therefore, that these hearths were used for disposal as well as food preparation (Sergant 2006, 1006).

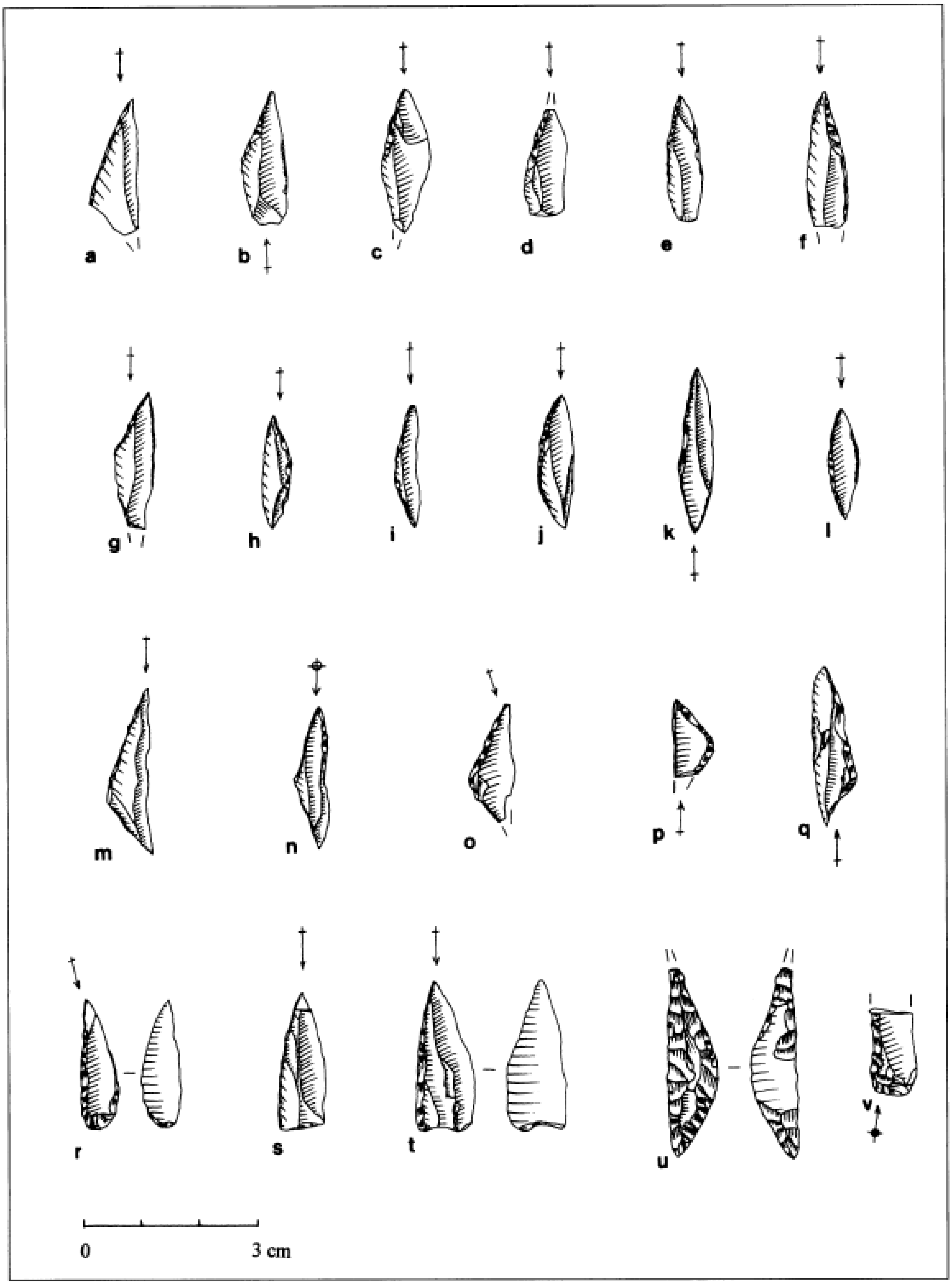


Figure 43. *Mesolithic flints from Verrebroek Dok; obliquely truncated points (a-d), unilaterally backed points (e-f), trapezoidal point (g), crescents (h-l), scalene triangles (m-q), atypical point with retouched base (r), typical points with retouched base (s-t), point with flat retouch (u), fragment of backed bladelet (v)* (Crombe 2001, 257)

Region V

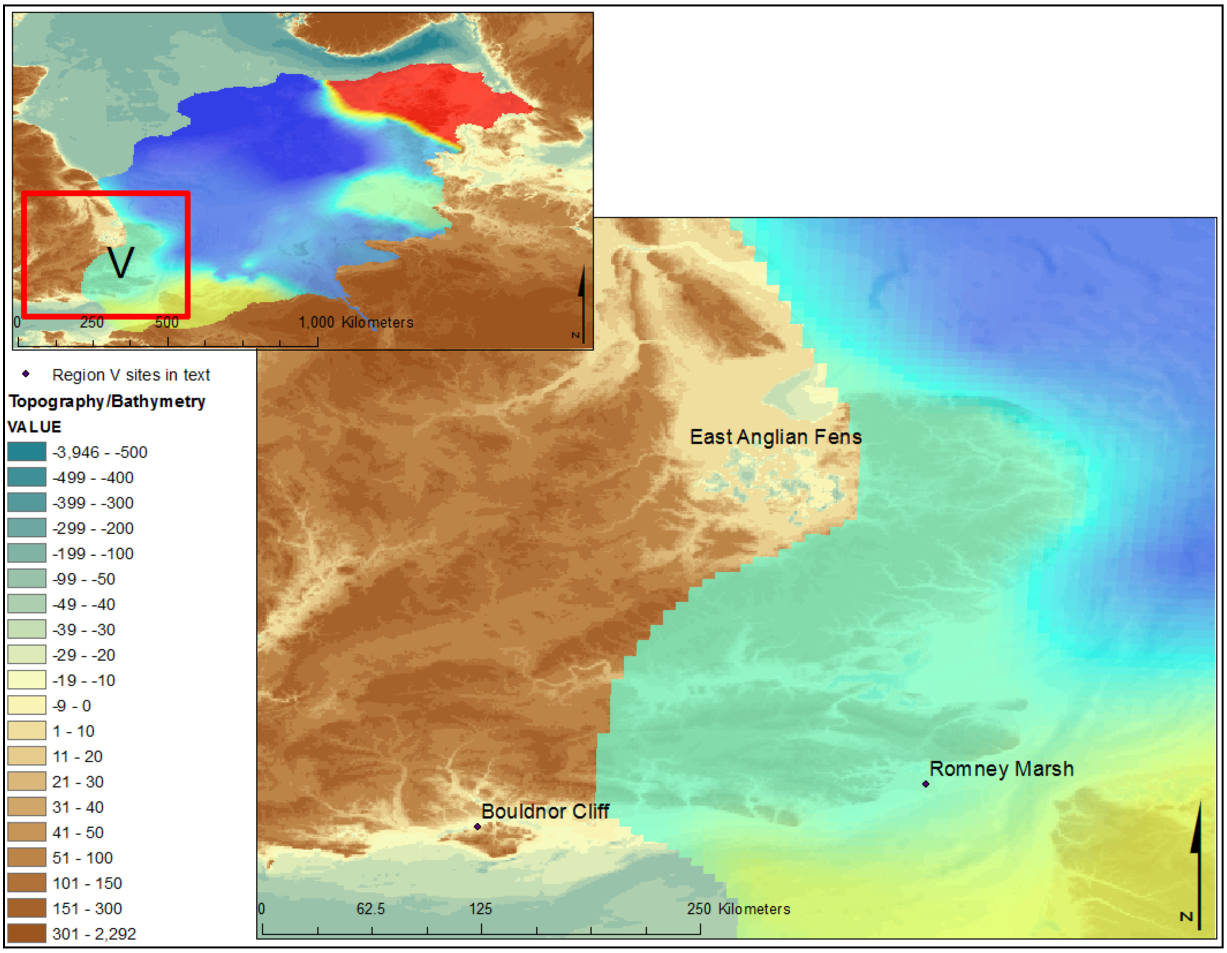


Figure 44. *Map of Region V with sites mentioned in text, drawn on GEBCO bathymetry*

The patterns of uplift and subsidence similarly in Region V show a region of high uplift in the Scottish, northern extent, due to rebound following the retreat of the British reaches of the LGM ice-sheet (Shennan 2002). Maximal subsidence is seen to the southwest of the island extending into Wales. Beneath the more stable London-Brabant massif (Figure 28) however, in the southeast of the region, is an area of moderate subsidence at a rate of ~ 0.5-1.1m/y (Shennan 2002). The far south-east, Region V, in the Mesolithic landscape around Romney Marsh has subsided more dramatically, creating a low-lying marshland inundated during the early Holocene. The impact of the more moderate early Holocene subsidence on RSL data correlates Region V with the continental patterns seen during the formation of the southern North Sea basin and unites this region as a unified study area.

Across the North Sea, passing under the submerged landscapes currently being modelled and further studied on the Dogger Bank in Region VII, is Region V. This area, due to its uniquely dense net of Mesolithic artefact finds with comparatively little regional synthesis, has been selected as the context for further micro-scale. It is a region largely defined by four key sites, most of which lie just exterior to the study area's spatial focus; Bouldnor Cliff in the English Channel, the catchment surrounding Romney Marsh which spans the English Channel and the North Sea, the East Anglian Fens to the north west of the study region, and Star Carr to the north. In many ways, the archaeology of Region V shows similar patterning to Region I. The chronology of the Region V Mesolithic is akin to that demonstrated north-west of the macro-study area, beginning near to the Younger Dryas-to-early Holocene transition as seen across the study region, and succeeding into the Neolithic comparatively late for the southern North Sea basin, up to 1000 years after the last Mesolithic finds in nearest Region IV. The general Ertebølle progression of lithic sequencing can be seen to apply to much of Region V's artefacts, microliths giving way to larger ceremonial blades and finally to the greater degree of diversity and specification of the late Mesolithic tool kit.

Equally, evidence from Romney Marsh (Waller 2003) and Bouldnor Cliff (Momber 2000) shows that the vegetational succession from pre-Boreal pine forests to the expansion of elm and hazel to the dominance of lime, beech and oak and the final collapse of the elm population closely reflects both the vegetational sequence and timing indicated in Region I. The importance of these changes to coastal communities interacting with the coastal environment on a day-to-day basis in the course of their habitual actions has been demonstrated on the micro-scale in the East Anglian Fens (Sturt 2006), emphasising the suitability of this region for further research into the relationship of Mesolithic people with the shifting environment in Region V. However, there are a few key differences between Regions I and V. Region V does not show any evidence for shell middens, a prevailing characteristic of the Mesolithic in Region I. While these are seen further north, in the modern-day country of Scotland, middens are not found on the western coast of the southern North Sea basin. At Bouldnor Cliff (Momber 2011) there has been interpretation of early sedentism and enduring settlement, long before this was seen in Region I. Conneller (2010 presented paper MESO2010) has demonstrated persistent revisitation and long-term use of the landscape at the Vale of Pickering, too, earlier than seen in the progression established by evidence from sites on the north-eastern coast of the study area.

At Bouldnor Cliff, possible evidence for a log-boat building site may indicate longer distance travel and increasing mobility in the later Mesolithic (Momber 2011), at odds with the Ertebølle model. The archaeological and palaeoenvironmental evidence from Region V will be further explored in the micro-scale study presented in Chapters 5 and 6.

In opposition to the character of the archaeology conducted in Region III, that in Region V is mainly accessible through excavation. While there are many surface scatters available for research, as seen through Wymer's gazetteer of Mesolithic artefacts in Britain (1977), these are most often found at the current surface due to post-depositional effects, specifically ploughing, removing them from their original contexts. Certainly palaeoenvironmental information is mainly available only through boreholes, some of which may have to be very deep (e.g. in excess of 20m in areas of East Anglia and in Romney Marsh) before Mesolithic material is reached. Therefore, the landscape-approach site seen in Region III, incorporating many different data sources into analysis and interpretation is much more difficult to achieve in this region. This, in many ways, explains Clark's insistence, throughout his body of work, on total archaeology conducted on the micro-scale as his work was conducted in Region V where, without an extensive pattern of excavation and coring, high-resolution data, illuminating the details and texture of Mesolithic life were not available on any other scale.

Region VI and VII

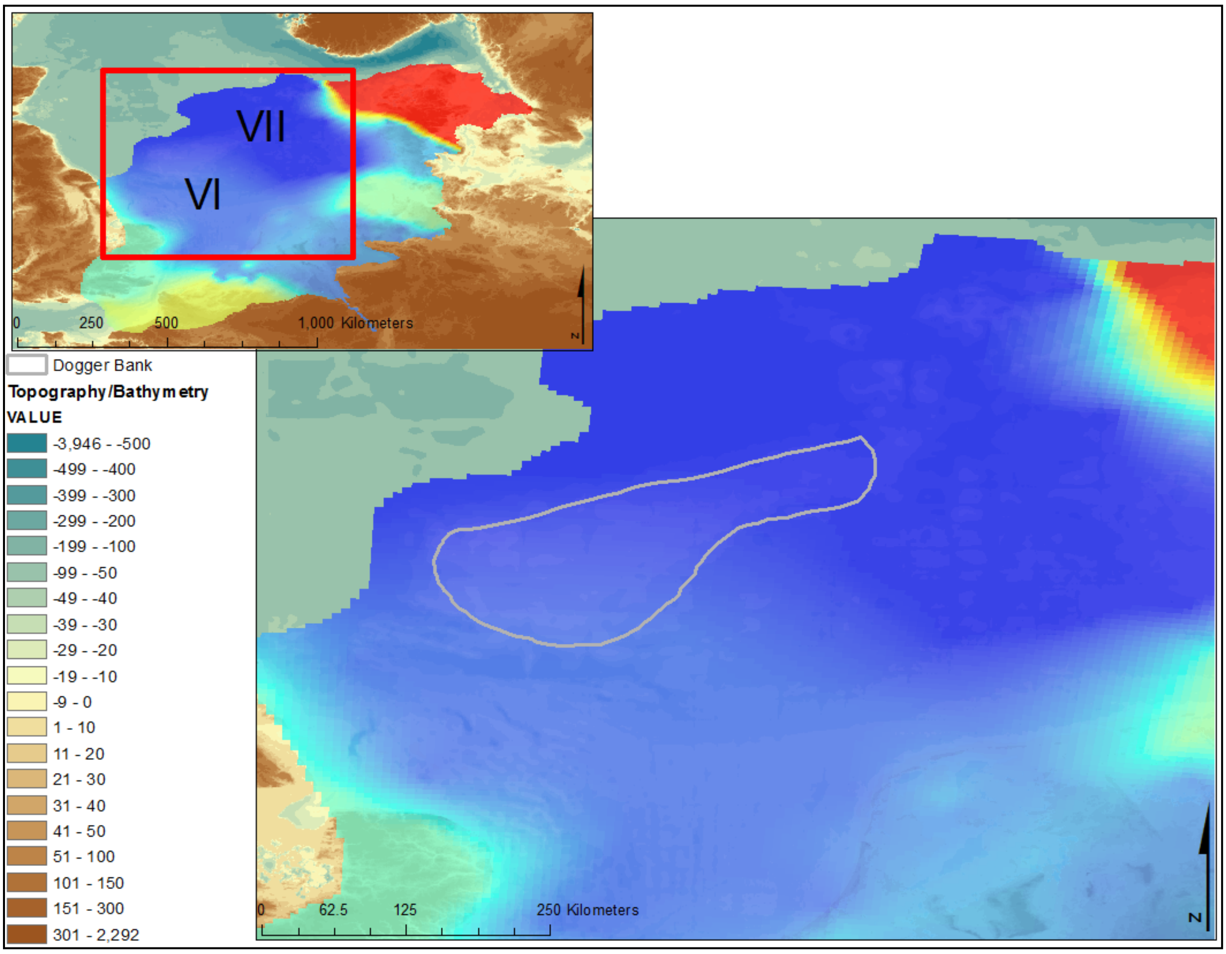


Figure 45. *Regions VI and VII drawn on GEBCO topography/bathymetry highlighting the location of the Dogger Bank following from Gaffney 2009*

Due to constraints in the location and excavation of submerged palaeo-landscapes, little is currently known about the deep water regions VI and VII. With new developments and applications of technology, these have become possibly the most kinetic areas of research in prehistoric archaeology of North West Europe. Data from these previously little-explored, underwater landscapes are new and extremely compelling. The North Sea Megasurvey conducted by the Petroleum Geo-Services (2009) has provided some insight into the shape and character of this surface. Several projects centred on accumulating information from the Dogger Bank have served to grow the expectations of the potential value of this research. Additionally further work across the wider southern North Sea stretch is being currently developed. The Hampshire and Wight Trust for Maritime Archaeology (HWTMA) and the Association for the Development of Maritime Archaeological Research (ADRAMAR) have created a collaborative initiative evaluating submerged prehistoric sites across the English Channel and very southern reach of the southern North Sea basin extending into our Region IV and further south. Work at the National Oceanographic Centre and Centre for Maritime Archaeology at the University of Southampton is investigating the relict landscapes of the offshore Thames Valley Estuary; though focused primarily on earlier prehistoric periods, associated core material dated to the early Holocene will no doubt provide an invaluable contribution to interpretations of the Mesolithic environment in Region VI.

Research from Region VII's Doggerland predates current technological advances and has been of known worth to Mesolithic archaeology since the 1931 find of a harpoon point in this submerged landscape, proving past habitation and the adequate, or excellent, preservation of archaeological material (Coles 1998). Though the Doggerland is situated very near the collapsed glacial forebulge, and is in the centre of maximum crustal subsidence, it was the last substantial land-surface to experience complete inundation during the final formation of the southern North Sea basin. The nature and particularly the rate of this submersion is a contested topic in current archaeological research. Thus, it has been an attractive and easily discernable area for further study. Since 2005, the University of Birmingham has conducted a mapping project using seismic three dimensional recording as a 'speculative survey' of the archaeological potential of this region (Gaffney 2009). While this work has been critiqued (Bailey 2010, 145) for its lack of ground-truthing and concerns that the equipment, traditionally used for geological purposes, samples too deep a record to be tailored for archaeological use, it is an important step towards prehistoric cultural research in the underwater reaches of the southern North Sea. As none of the core samples taken to date in this region has been useful for archaeological or palaeoenvironmental analysis, predictions of the environmental parameters on the Dogger Bank are based on the surrounding coastal landscapes described for regions I-V (Bailey 2010, 145). Importantly for this dissertation, the outside-in, coastally-based interpretations of the Mesolithic on the Dogger Bank negates any possibility for using this research as the basis for a single-surface approach to the study of the prehistory of the southern North Sea basin. The agendas and archaeological traditions of the surrounding modern countries are already entangled in the conceptualizations of this central, submerged landscape. However, the nascent work on this region is critical for terminally annihilating any remnant connotations of the reducing stretch of land between the continent and Britain during the early Holocene as a 'land-bridge' (Coles 1998, 45). This was inhabited land, occupied and used as it became coastal and finally submerged and it is very unlikely, that Mesolithic people conceived of this region as a pathway between Britain and the continent. Further work in Regions VI and VII will be critical in creating a thorough picture of any patterning in either environmental or cultural shifts between Regions I,II,III and IV and Region V.

Conclusions drawn from macro- and meso-scale archaeology

In summary, the macro-scale study area has been divided along diffuse regions of isostacy to separate out localized variations across space and see how the patterns of archaeological evidence and research deviate along these loose borders. In northern continental extent of the macro-basin, Region I, is characterized by a pattern of tilting uplift and subsidence along a northeast to southwest running axis parallel to the concentric isobars radiating from the centre of post-glacial Fennoscandian rebound. Further south, the region is dominated by the hypothesized collapse of the peripheral bulge, centring with maximal subsidence rates in Region VII, which also displays the impact of hydro-isostatic subsidence. Bordering Region II, however, shows reduced rates of subsidence as compared to adjacent regions, possibly due to the mitigation of hydro-isostatic impact. South from this coast, is the maximum coastal expression of subsidence in Region III. The decreasing subsidence to the south of this region and to the negligible impact seen in Region IV, is indicative of a general pattern of a north-east trending impact of glacio-isostacy, with a smaller north-west trending impact of hydro-isostacy due to post-LGM water-loading in the North Sea basin. Across the North Sea, there is an area of moderate subsidence in Region V with localized increases, corresponding to the continental patterns on the opposite coast. These topographical patterns form a more appropriate basis for a spatial framework of the southern North Sea Mesolithic than the modern political boundaries conventionally applied.

The archaeology of each of these regions upholds some of the generalizations seen in the macro-scale literature for this basin. The roots of these conceptualizations and of some of our current debates are certainly apparent through a meso-scale approach. Importantly this epistemological scale challenges some of the fundamental understandings of what it meant to be Mesolithic and of how communities living in this basin interacted with their world.

The significance of environmental change is upheld as the grounding texture to Mesolithic life on the macro-scale. Shifts in vegetation show regional variations in timing and the micro- to meso-scale research provides a richer resolution of study, but a similar pattern of transition is displayed throughout the study area. The open bush and herb ground cover habitats of the Younger Dryas were replaced with Preboreal *Betula* dominance and the recurrence of aquatic vegetation in the ameliorating climate. The birch forests were succeeded by hazel trees in the Boreal and followed by the Atlantic diversification of forest cover including lime trees, elms, oaks and beech trees. At the time of the decline of the Mesolithic in regions I and V, into the beginning of the Neolithic in regions further to the south, the Subboreal began with the decline of the once-vibrant elm population. In none of the recent meso-scale literature, is this decline attributed to human influence, but is ascribed to a prehistoric equivalent to Dutch Elm Disease (e.g. Schroder 2004).

Landscape inundation, too, occurred at different times throughout the formation of the North Sea, as is obvious by the maps modelling coastline retreat. However, the importance of its impact on the archaeology and on the habitation is marked in each meso-scale publication. Interestingly, however, only literature from Region VII indicates the importance of the 8,200BP Storegga slide inundation event (Figure 46). While it was most important on the Dogger Bank, terrestrial until this point, the impacts of this catastrophic event would have been felt throughout the study area. This is one instance in which the macro-scale research on the southern North Sea basin could very usefully inform the palaeoenvironmental interpretations conducted on the meso- and micro-scales.

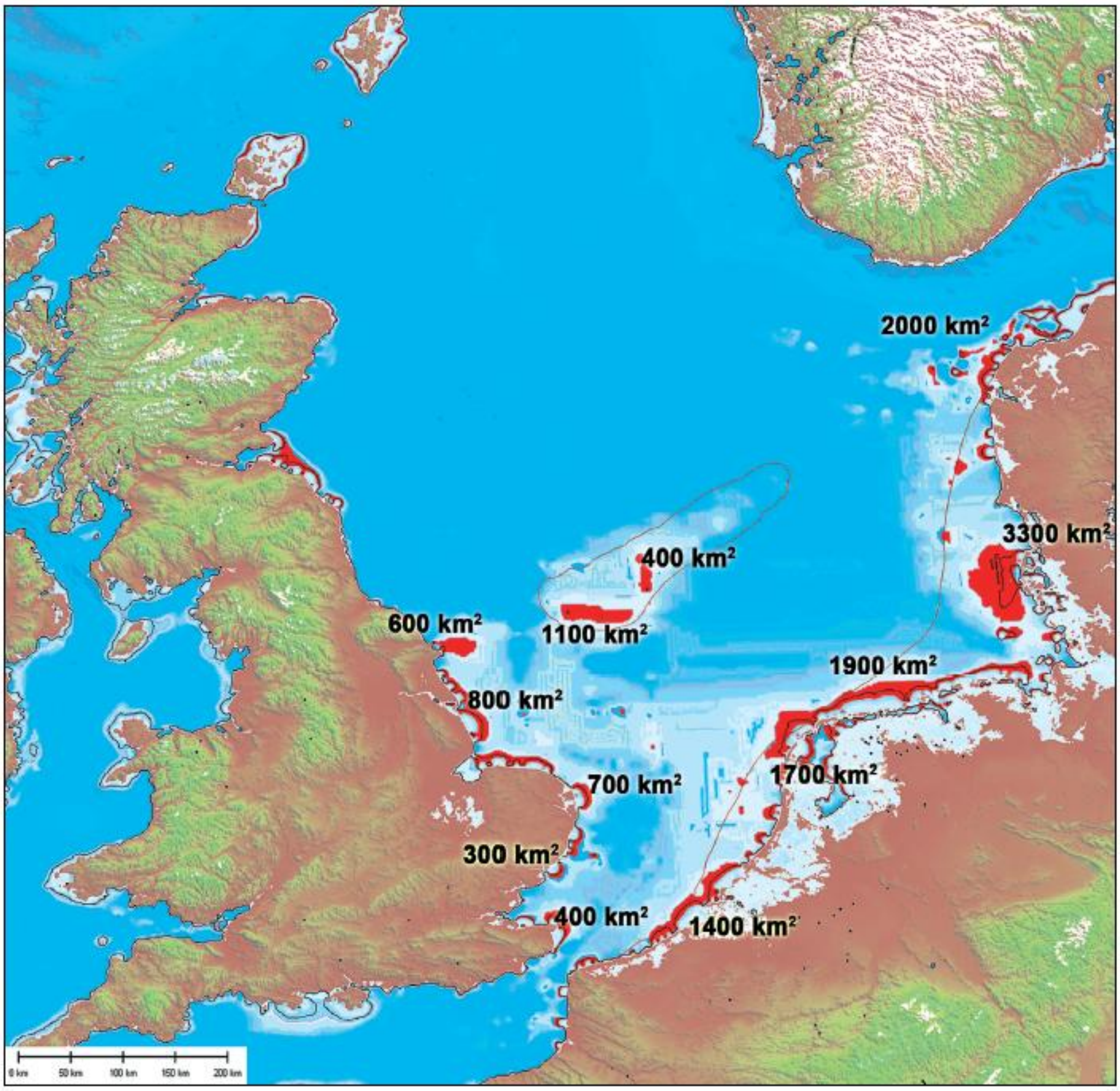


Figure 46. *Hypothesized regions of major impact from the Storegga Slide Tsunami. Areas in red are the heavily impacted 'run-in' regions, whereas the brown lines indicate regions of maximal impact in the 'run-up' area of the tsunami* (Weninger 2008, 12)

As is indicated by the conclusions above, chronology presents an important constraint to the amalgamation of a macro-scale interpretation of this study area. It has also been demonstrated (Chapter Three) to be one of the most difficult components of Mesolithic research to address on the macro-scale. Table 2 shows the range of dates applied to the Mesolithic across the southern North Sea. Price (1991), brackets the Mesolithic in North West Europe from 9500BP-5000BP. However, these dates are clearly not applicable throughout the entire region, due to the time-transgressive issues seen not only between meso-scale regions, but also between local sites within these smaller areas. Through the dates of first evidence of Mesolithic and Neolithic practices, a progressive trend of slower adoption of new technological and cultural practices from south to north within this region can be seen qualitatively despite complications in the quantification of this trend due to widely-varied dating systems. Therefore, when we follow Clark (1932), as we still do, and bracket the chronology of this time period between the start of the Holocene and the transition to the Neolithic, we are saying very different things depending on the region being researched. This effects our understanding of macro-environmental patterns applicable to the Mesolithic and of the rates of change, environmental and cultural experienced during this period. Price stated that "definition of the term Mesolithic… has been a volatile and difficult issue. In spite of numerous characterizations of this word over the last 50 years, it has become clear that the term has significance only in a temporal sense" (Price 1983, 762). To the contrary, it is here argued that any definition of the Mesolithic has consequence not only in situating this period in time, but in directing how the Mesolithic is conceptualised, and in how we focus our research. In fact, as can be seen through the meso-scale archaeological review, the term 'the Mesolithic' has very little temporal specificity. We must, then, be as careful with our applications of temporal scale as with spatial scale over this very dynamic period and location. With so many factors through which to define the beginning and ending of the Mesolithic and the multiplicity of dates to apply to each of these components, we must be especially sure to apply chronological boundaries which enhance rather than inhibit interpretations of prehistoric life. Where it is inappropriate to classify this period of time through lithics, the environment or cultural signatures alone, the temporal framework must suit the focus of the study being conducted and guide research along logical lines.

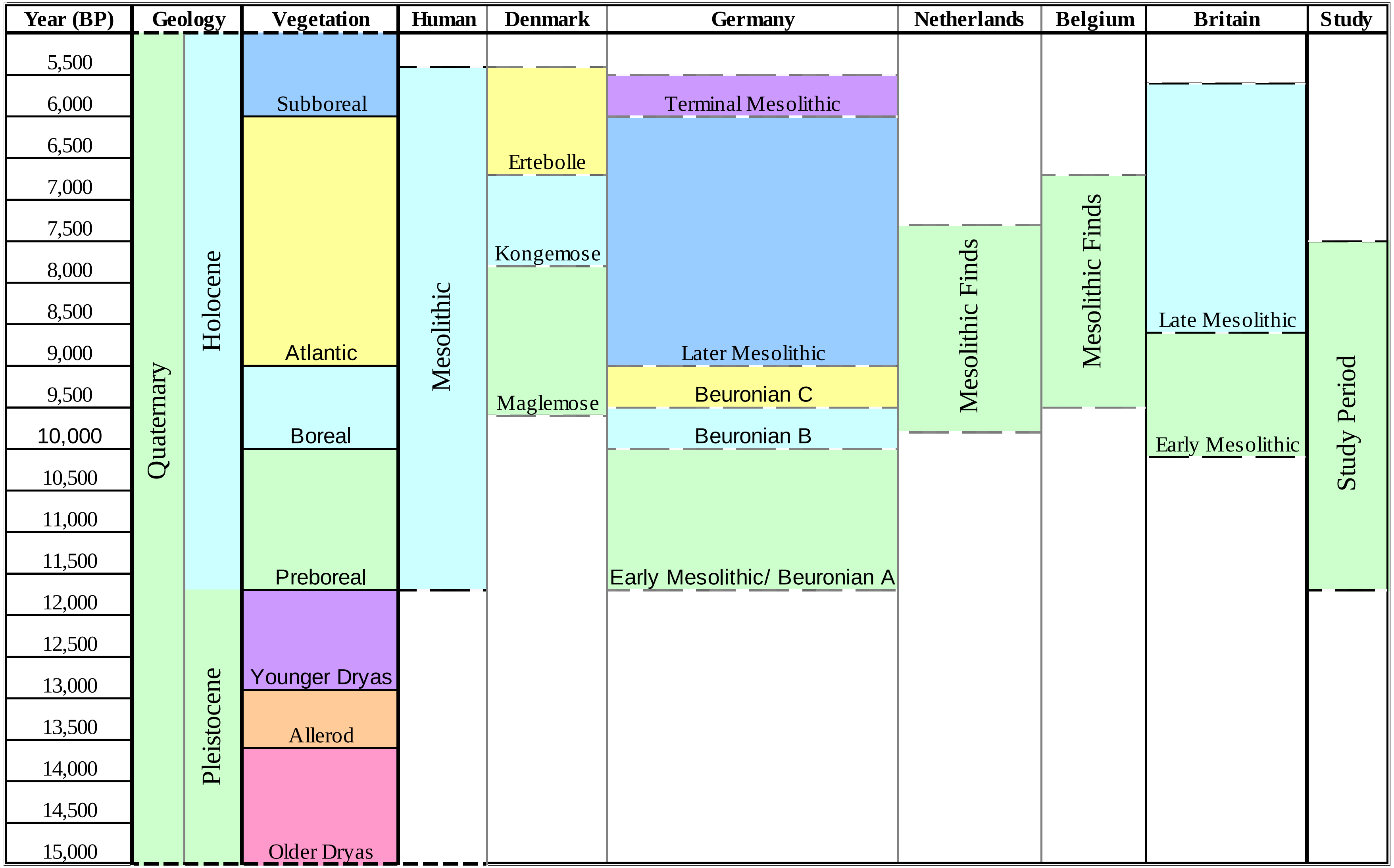


Table 2. *Chart depicting time-transgressive chronology of Mesolithic across southern North Sea basin*

Similarly, the meso-scale literature reemphasises the complexities of defining a standardised spatial extent of the southern North Sea coastal zone; this resists amalgamation into a general rule, and has thus been considered on local and small regional bases. The coastline and geomorphology of the Region I is entirely classed as coastal. However, Region II and the Region III exhibit coastal influence only as far as the inland loess-covered regions of modern central Germany. Region IV presents coastal effects reaching towards the Rhine/Meuse Valley, but not into the cover-sand regions and higher topography beyond this. Meso-scale topographic and soil typology analyses are important in interpreting a coastally influenced environment throughout the study region.

Related to this, are the discussions of community and individual movement within and through the southern North Sea basin. Generalization on the macro-scale strongly argues for the pattern of sequential reduction in average distance covered by Mesolithic communities; as culture 'advanced', communities by this model should become more sedentary. However, this pattern is overturned by meso and micro-scale investigations. While comparatively few of these smaller scale studies address the extent of Mesolithic mobility; macro-scale over-views routinely list migratory patterns, especially decreasing seasonal round cycles, as a significant characterization of Mesolithic life; local variation in both distances covered and frequency of travel is robustly apparent. In the south of Region IV, Dupont (2009) argues for a relatively restricted region of community mobility in the early Mesolithic, less than 30km, as evidenced by statistically significant differences in carbon isotopes found at various coastal sites in the region. He equally uses zoological remains at these sites to suggest similarly-limited patterns of coast-to-inland seasonal migration. Stylistic regionality in lithic typologies and source material reinforces his argument. Meanwhile, Jochim (2006), stemming from source locations of Jurassic Chert found at many sites in Region II and the north of Region III, interprets regular seasonal migratory movements of ~300km seen into the late Mesolithic. Lovis (2006) in a synthesis of papers from the CAA conference on Mesolithic Mobility (2006) suggests, in line with Zvelebil (2006) mobility at multiple scales, regional (<100km), inter-regional (100-300km) and that conducted over >300km where there was access to water-craft. If, in fact, the site at Bouldnor Cliff proves to contain evidence for Mesolithic boat building, then possibly, in this region of the southern North Sea basin, at least, these high migratory distances could have been seen.

The lack of more vigorous explorations of mobility patterns, on each scale, is likely not only due to the reduced amount of available evidence, but also stems from the conceptions detailed by Price (1991), Spikins (2010) and others of the 'patchwork nature' of the North West European Mesolithic. Made emphatic by national priorities and ingrained differences in archaeological traditions, the rigidly-defined pockets of research have created what Louwe Kooijmans (2010, 245) called 'shining oases of Mesolithic material' which excludes thoughts of mobility and movement around or through these study areas. A single-surface approach, structured and organised around diffuse regional foci, energetically promotes the idea of movement, that most fundamental component of perception.

The local diversity seen in mobility patterns leads into the most important challenge to the macro-scale generalizations: the application of a single cultural model is strikingly inappropriate over the lateral extent of the southern North Sea basin. While the Mesolithic began in places with a confirmed hunter-gatherer model of prehistoric life and did end with the adoption of a recognizable lifestyle centred on farming practices, in this growing sense of familiarity, there lies an ideological trap. It is instinctive to assume that Mesolithic changes occurred in a set of progressive steps. This is the Ertebølle model, which was borne out clearly in Region I and also seen in parts of regions II and V. Tool typologies progressed from microliths and barbed points in the Maglemose, to core and blade technology and large symbolic blades in the Kongemose, to a larger diversity and specialization of stone tools and the introduction of pottery in the Ertebølle. Meanwhile, small, mobile camps of single family units demonstrating seasonal habitation of landscapes gave way to larger camps with year-round habitations tending towards increasing sedentism. Increased organization of habitation centres into activity zones in the later Mesolithic has also been argued for at Tybrind Vig and Saltbaek Vig. This pattern fits well with the idea of a move from a "foreign", Palaeolithic lifestyle to one more similar to our own. However, this is vigorously challenged by the archaeology from regions III and IV and by the early settlements interpreted at Bouldnor Cliff in Region V. In the Rhine Valley, large decorated blades, interpreted as symbolic tools have been seen in the very early Mesolithic at Bedburg-Konigshoven, culturally much earlier than the Kongemose context to the north. At the sites of Siebenlinden, Groningen and Merselo-Haag, a reduction in residential settlement size and duration has been noted as larger habitation centres gave way to shorter duration, small encampments. Siebenlinden also has evidence for a reduced clarity in the division of activity zones from early to later Mesolithic. These regions challenge the concept of a smooth progression from small, mobile, detached camps to large, settled, well-organised camps, preparing to adopt Neolithic practices, as would fit a Transitional period.

The preservation of the material from the Danish Mesolithic, particularly, and the depth of research from this modern country, has lent these sites a gravity in forming the current conceptions of the Mesolithic throughout North West Europe. These generalizations should be reconsidered as they are not upheld throughout this large region; nor are they upheld within the defined spatial focus of this dissertation. Examples of a different established pattern of the Mesolithic are close to hand. The Irish model for this period is not distant spatially, but conceptually runs nearly backwards to the Ertebølle generalization (Bradley 2007). While Bradley groups northern Europe into a 'Scandinavian model' with increasing sedentism and social complexity, he indicates that in areas of Britain and Ireland, the best evidence for social complexity is from the earliest Mesolithic and that there was, if anything, increased mobility towards the end of this period (Bradley 2007, 32). The meso- and micro-scale archaeology from the southern North Sea basin clearly shows that the Ertebølle model, attributed to the whole of northern Europe, is only upheld in smaller regional variations and should not be used to define how Mesolithic life is interpreted throughout this study area. This is an intuitive and comfortable model for us as researchers, but is persistently demonstrated to fail as an encompassing characterization of the Mesolithic experience over the macro-basin.

Instead, the relevance of environmental changes in the texture of vegetation, the shifting soil typologies and water quality and the inundation and recession of the forming southern North Sea waters was a uniting, if not stabilizing reality of life in this period and region. While the environment certainly does not equate to society, the level of dynamism in this component of coastal life was a foundational, interactive element of the Mesolithic in each region of this study area. The experience and perception of these changes was a coalescing force on the macro-scale. In discussions of absolute chronology, tool typologies, sedentism and social complexity, this region should not be amalgamated into an out-dated homogenization. Localized cultural variations in this way resist description over the macro-scale. To interpret such characteristics and patterns, the meso- and micro-scales should be applied as the dominant epistemological approach.

The meso-scale approach, therefore, especially in interaction with the macro-scale, offers a strong basis for researching the Mesolithic in the southern North Sea basin. Together, these provide an organically-derived means of organising space and highlight the rich variety in the temporal range of this period, the environmental changes and cultural shifts experienced throughout the macro-scale basin. However, this is clearly achieved through being informed by micro-scale research which has been built up into regional characterisations. The meso-scale literature has also highlighted inconsistencies in the connotations associated with, especially, the micro-scale; where in Region III this clearly refers to a more integrated landscape approach than in Regions I and V. Therefore, the micro-scale approach must be examined in creating a rigorous understanding of Mesolithic community perception of their environment and its dynamics, particularly to look at what additional information this offers and how we can resolve the definition of the site-scale.

Chapter Five: Micro-Scale – Methods

The central question arising in Chapter Two has to address the implications of different epistemological approaches on our constructions of the Mesolithic. This chapter, therefore, presents the methodology used to interrogate the micro-scale. However, beyond a critique of the ways in which we form our conceptualisations of this period, this dissertation also sets out to ground the theoretical objectives in the practicalities of archaeology at the micro-scale, and to contribute a meaningful addition to the Mesolithic archaeological record in the southern North Sea basin. Changes in the Mesolithic environment were perceived on a human-scale, one-to-one basis, and archaeology is traditionally conducted through site-based work. Therefore, the following two chapters have two primary aims; to create a high-resolution understanding of process in a micro-scale landscape, contributing to the archaeological record, and to explore the implications of a bottom-up approach as applied to the Mesolithic of the southern North Sea, responding to the question set out in Chapter Two. The landscape around the Waveney valley was selected as it offers a unique opportunity to usefully increase the analysis and interpretation of the Mesolithic archaeology in Region V while working further towards these two goals. Of the projects discussing the evolving stratigraphy of the Waveney landscape, none have been considered from the perspective of Mesolithic community interaction with these changing sediments and the environmental proxies they contain.

To continue pursuing the concept of Mesolithic perception of their environment as the common thread through which we can tack between scales, the micro-environmental dynamics needed to be modelled for the Waveney landscape to explore the character and rate of change in the context of human interaction. First, a geological model of the pre-Holocene landscape was required to establish the nature of the environment leading into the Mesolithic. Holocene infill of the river valley and the extant archaeological record could then be compared against this surface. Time-steps in the formation of Holocene sediments were then modelled in order to build in the element of process and create an understanding of the changing texture of this landscape from the sediment typologies and the associated palaeoenvironmental data contained within these stratigraphic layers. Spatial variations in the artefact record were examined in conjunction with this modelled understanding of environmental dynamism. Underlying each graphical analysis was the need for transparency in presentation of the limitations and advantages of both the geological and archaeological records which form these models and the resulting interpretations. Each of these methodological steps and the margins of uncertainty arising from them will be detailed in the following chapter.

Chapter Five, then, focuses on the creation of the stratigraphic models and on the palaeoenvironmental and archaeological information used in interpreting the Mesolithic of the Waveney valley. In summary, a total 1444 boreholes were used for geological modelling from an overall database of >2000 original records evaluated for use in this dissertation. Of these, nine cores had been radiocarbon dated. A further six on-shore cores with associated radiocarbon dates were included in analysing the age of sediment against its depth. Nine off-shore cores were modelled independently to provide a comparison between currently submerged and terrestrial stratigraphic sequences. Relative Sea Level curves from Shennan's (2002 and 2006) publications were compared with graphs produced from dated sequences in the geological models. Pollen, diatom and foraminifera data from published and grey literature sources were used to generate a discussion of palaeoenvironmental texture. Archaeological data from John Wymer's (1977) gazetteer, the National Monuments Record, and the Historical Environment Records from both Norfolk and Suffolk County Councils were collated into a GIS for spatial analysis.

The results of this work will then be used to discuss the evolving story of the Waveney valley Mesolithic in Chapter Six. The value of micro-scale modelling and multi-scalar analysis around the currently coastal stretches of the macro-scale study area can, thereby, be better quantified. Importantly, the products of this work carry strong implications for strategies to be used in the future collection and interpretation of further cores from the submerged landscape of southern North Sea.

Site Selection

Region V was selected as the meso-scale context of further micro-scale analysis due to the contrast between its long standing history of archaeological and palaeoenvironmental research and the comparatively meagre field of integrated interpretation of this landscape. While key sites and projects have been thoroughly developed and frame the British understanding of the Mesolithic, many of these projects are on the outskirts of the spatial focus determined by this dissertation. Furthermore, these sites are not often considered within the wider context of the southern North Sea Mesolithic. The implications of the information coming out of these sites do not often get considered in the context of how they may inform future projects in the North Sea, something which could be especially useful for the developing work in the currently-submerged landscape. Conducting further micro-scale analysis and interpretation within Region V offers us the opportunity to explore how the established macro- and meso-scale patterns discussed in Chapter Three unfolded and were expressed on a human-scale landscape in this reach of the southern North Sea basin.

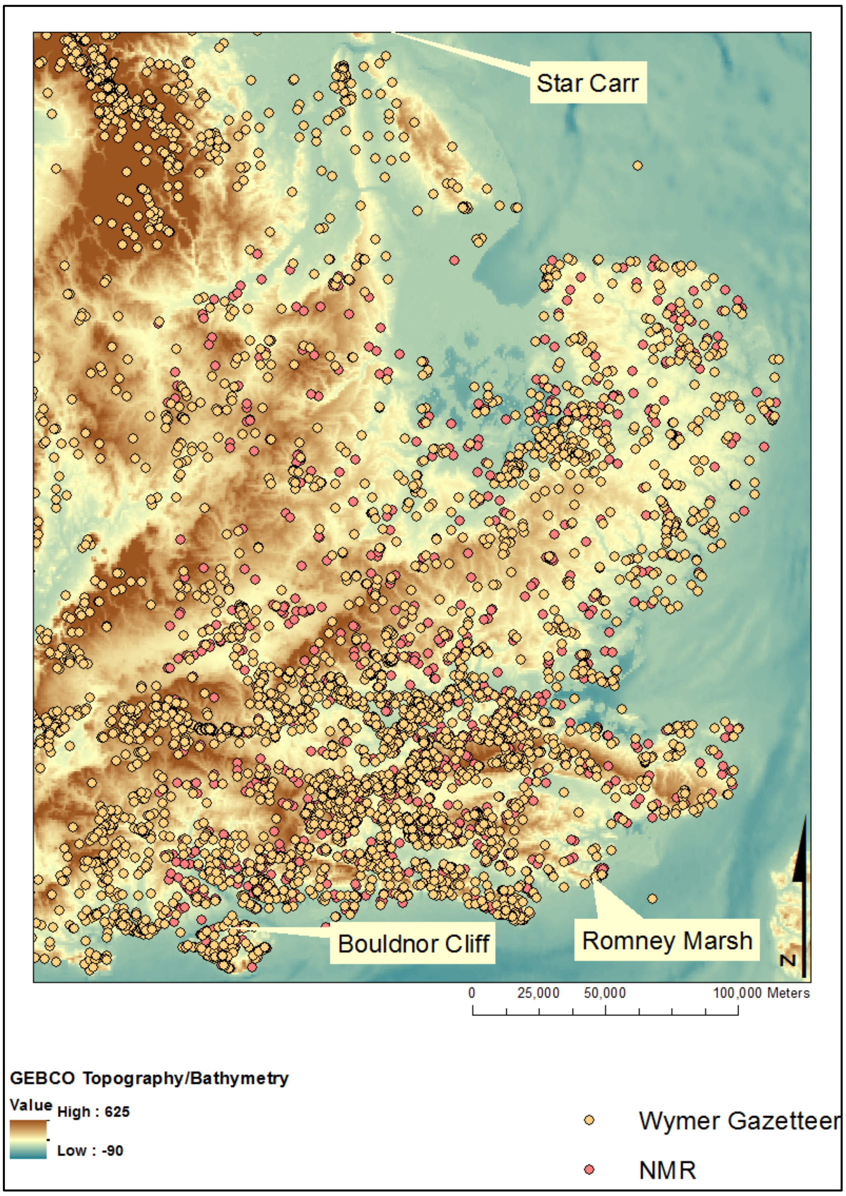


Figure 47. *Location of sites mentioned in following text layered against distribution of NMR and Wymer Gazetteer Mesolithic artefact finds against background mapping of GEBCO topography/bathymetry*

Bouldnor Cliff, for instance, contributes much to our ideas of Mesolithic communities living in this landscape (Momber 2011). The environmental analysis of monolith tin samples and macro-fossils taken from the submerged cliff provide a wealth of information on the early Holocene climate in this region. Information derived from artefacts found in and around the three hearths discovered at the bottom of the cliff also gives us valuable information on the habitation of a vulnerable coastline undergoing the effects rapid sea-level rise (Momber 2000, 2011). However, it is situated in the English Channel and experienced potentially quite different reactions to the Post-Glacial rise in sea-levels than landscapes situated in the southern North Sea basin. While this work, in conjunction with the off-shore studies from Region I, and the artefacts and cores from Regions VI and VII are vitally important to our growing understanding of the potential of submerged prehistoric data, it is not a correlate for further investigation into the changing micro-scale textures of the southern North Sea coastal extents.

Romney Marsh proffers a strong history of research into the early Holocene palaeoenvironmental history of this landscape, but the geography of this site has created strongly resilient river valleys which have preserved little record of the interaction of this landscape with the rising North Sea and English Channel waters. Comprising Romney Marsh proper, Walland Marsh, the Dungeness Foreland and the four river valleys of the Rother, the Tillingham, the Brede and the Pannel, this initially seemed a logical position from which to begin micro-scale investigation in Region V. The British Geological Survey have proven the existence of a buried palaeolandscape in Romney Marsh proper and Walland Marsh, and peats in core samples from the surrounding landscapes at Pannel Bridge and Tilling Green in Rye have been dated to 6000BP, 7000BP and 9200BP (Long 1). However, the buried palaeolandscape under the marshes is over 30m deep through compacted sediment making the collection of a significant net of boreholes impossible at this time. The landscape of the Brede, Pannel and Tillingham valleys further upstream from Pannel Bridge and Tilling Green become increasingly steep, a gradient which dates back to the earliest Holocene, and are covered in thick alluvial clay (Long 2007 and Waller pers. comm.). Therefore, while providing solid contextual information, Romney Marsh was not considered a suitable case-study with which to answer the aims of micro-scale work in this dissertation.

Star Carr is perhaps the most influential Mesolithic site from the spatial context surrounding Region V. This site and the adjacent Vale of Pickering landscape, with its longevity and breadth of study, perhaps goes the furthest to explore the nature of the changing environment and the relationship communities living here had with this dynamism. Work on this site has provided strong new interpretations of the spiritual and symbolic life of Mesolithic communities. Importantly, at Star Carr, the environmental has been integrated with the archaeological (Conneller 2003 and 2005). However, as with Bouldnor Cliff, this research is situated outside the spatial focus of this dissertation. Located further north, the Star Carr and Vale of Pickering landscape is in a different isostatic regime than that defined for Region V. Moving north, up the coast of the modern United Kingdom, isostatic uplift increases dramatically to experiencing net uplift and different archaeological patterns than those seen in the southern, subsided region. Therefore, while no site in Region V can currently rival the history and scope of the work done at Star Carr, this site cannot satisfactorily be extrapolated to the palaeoenvironment in Region V. In this way, neither does it fully answer the implications for further studies throughout the macro-scale study area. If anything, this work can be used to highlight the insufficiency of single micro-scale studies in interpreting the wider context of the southern North Sea Mesolithic, and the need for further integration between projects and scales.

In the middle of the triangle framed by these three sites, is a wealth of archaeological and palaeoenvironmental data. Taking the John Wymer (1977) gazette of Mesolithic artefact finds, the thick density and wide distribution of Mesolithic material in this landscape can begin to be seen. Equally well distributed is the borehole record database assembled by the British Geological Survey. While not absolutely comprehensive, this compilation gives a solid primary understanding of the availability and history of boreholes collected in Region V. The confluence of archaeological and palaeoenvironmental data combined with the research questions opened up by sites like those discussed above, created a solid framework for micro-scale study in Region V. Similarities in isostatic movement with Region II, another portion of the southern North Sea coastline with opportunity for further archaeological investigation due to key gaps in research, consolidated the decision to base the micro-scale case-study here. Using a GIS project plotting archaeology, palaeoenvironmental and palaeogeographic data, and previous Mesolithic and early Holocene research as a prospective tool to locate this study, the landscape around the River Waveney was selected as useful candidate for further investigation into smaller-scale expressions of the dynamic southern North Sea environment. This was an area of well-established Mesolithic habitation in a stable landscape with a good history of research proving the potential of this river valley for modelling, analysis and interpretation of environmental changes relating to the early Holocene rise in North Sea waters.

The Waveney Valley

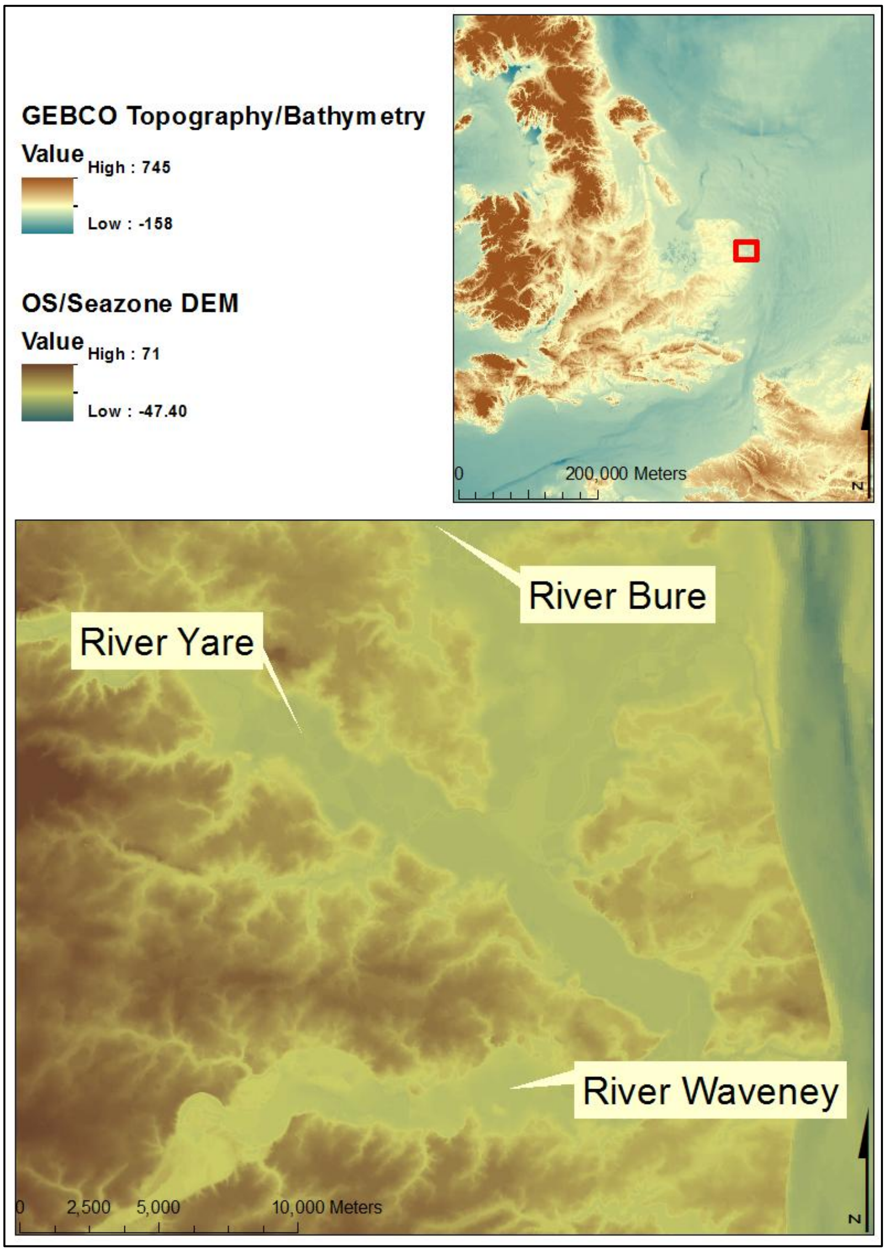


Figure 48. *The Waveney landscape, framed by the Rivers Waveney, Yare and Bure against GEBCO topography/bathymetry and a mosaiced OS/Seazone DEM*

The River Waveney is located in the north of Region V, running west to east and turning north along the current coastline to merge with the Rivers Yare and Bure into Breydon Water where they together empty into the North Sea. The Waveney has one significant tributary, Fritton Decoy, which branches seaward below Breydon Water. The river is now incised into the surrounding Lowestoft till surface by between 20m near to the source and 30-35m at the coastal edge. The present day floodplain extends from Lopham to Ellingham and maintains an average gradient of 0.45m/km (Allen 1982). The morphology of this floodplain is similar to others in the region and represents a valley fill of sand and gravel overlain by an accumulation of clay and silt and extends between 0.5km and 3km. The sands and gravels of the Waveney Floodplain were deposited before the Late Devensian while the accumulation of alluvium is Post-Glacial (Allen 1982).

The importance of this valley, and the surrounding context of East Anglia to the Quaternary history of Britain can be seen in the number of stratigraphic types from Pleistocene climatic stages named for sites in this landscape: Cromerian, Anglian, Hoxnian, Ipswichian (Wymer 1999). As a consequence of this history of geological research, much of the palaeoenvironmental and archaeological research based in this northern section of Region V has been focused on the Early and Middle Pleistocene palaeogeographies (Hill 2008). The importance of the thinner veneer of early Holocene sedimentation and archaeology on top of this depth of earlier material, however, is reflected in the thin but intensive veneer of research on the Mesolithic palaeogeographies, palaeoenvironments and archaeology.

A combination of LiDAR, aerial photography and spatial analysis of palaeoenvironmental data collected by the Suffolk River Valleys project has confirmed the earlier indications by Alderton (1983) that there has been negligible lateral movement of the Waveney valley through the duration of the Holocene. At the beginning of the Holocene, the coastline was ~7km further offshore from the modern drainage into the North Sea (Moorlock 2000). The valley stability has lead to substantial vertical and lateral accumulation of floodplain peats driven by in-situ organic accumulation occurring in a ‘backswamp’ floodplain setting (Hill 2008). Similar patterns are seen to the north of this valley in the Rivers Yare and Bure. The Holocene stability of this river system and the significant sediment accumulation during the flooding of the North Sea provides valuable insight into the changing Mesolithic landscape of this river valley and has created interest in the Holocene palaeoenvironment of this landscape. Indeed, the stratigraphy of the stretch between the Bure and the Waveney has been the subject of several investigations in the last 50 years (Jennings 1951, Coles 1977, Coles and Funnell 1981, Alderton 1983, Brew 1992, Arthurton 1994, Moorlock 2000), most recently as part of the Suffolk River Valleys project in 2008, focusing on excavation of a Bronze Age site at Beccles, but extending back to the beginning of the Holocene. Despite this considerable history of research and the large number of borehole records available from the British Geological Survey in this region, there has been no effort to date to integrate data from across these projects into a model of deposits of sufficient resolution to be archaeologically meaningful. Nor has a comprehensive database of the location of sediment cores, palaeoenvironmental samples and archaeological evidence from the Waveney landscape been collated. This has left a significant gap in the research, thus far restricting any attempt to consider human interaction with the deep record of Holocene environmental change. Without drawing together these sources and centring interpretation on the human-scale experience of the environmental change indicated by the data, we cannot use the sensitised approach to recreating our conceptualisations of this period called for by the trajectory of Mesolithic archaeology. If, as argued in Chapter Two, our theoretical stance has advanced to call for reintegration of specialist datasets to construct a better story of the Mesolithic, we must bear this out through the realities of our work at each scale. At the micro-scale in the Waveney valley, this entails amalgamating each of the extant resources and applying an analytical process which fosters, for the first time, interpretation of Mesolithic people and an actively engaged, dynamic early Holocene environmental texture.

Prior to the post-Devensian stability of the Waveney valley, and at its inception, the Waveney was descendent from the ancestral Bytham River, likely an important migratory path for the earliest hunter-gatherers (Hill 2008, 150). This major river drained a large part of Midland Britain from the southern Pennines to join the River Thames in East Anglia, into the region of the present North Sea basin (Bateman 1994, Rose 2001). The palaeoflow during the pre-Anglian, from west-to-east, opposite to the modern drainage network, was interrupted by the Anglian glaciations (Cook et al 1991). As this northern extent of Region V was covered by a large ice sheet, the ancestral Thames valley was pushed south (Bridgland and Lewis 1991) and the River Bytham was destroyed (Bateman 1994). Evidence for this river system exists in the discontinuous sediment body filling sections of the buried valley (Bateman 1994). Each catchment; the Bytham, Thames and northerly Amcaster river systems; contributed to the sediment of the North Sea delta and contributed to the lithologies of the Red and Norwich Crag; fundamental to the underlying Middle Pleistocene geology of the current Waveney Valley (Rose 2001). Subsequent climate amelioration at the end of the Anglian, and associated downwasting and ice retreat resulted in the deposition of the glaciofluvial sands and gravels which form the Lowestoft Till context of the modern River Waveney (Bridgland and Lewis 1991). Fluvial incision through this newly created and freshly exposed landsurface resulted in the creation of the new drainage network, forming the basis for the present rivers Waveney, Yare and Bure (Bridgland and Lewis 1991).

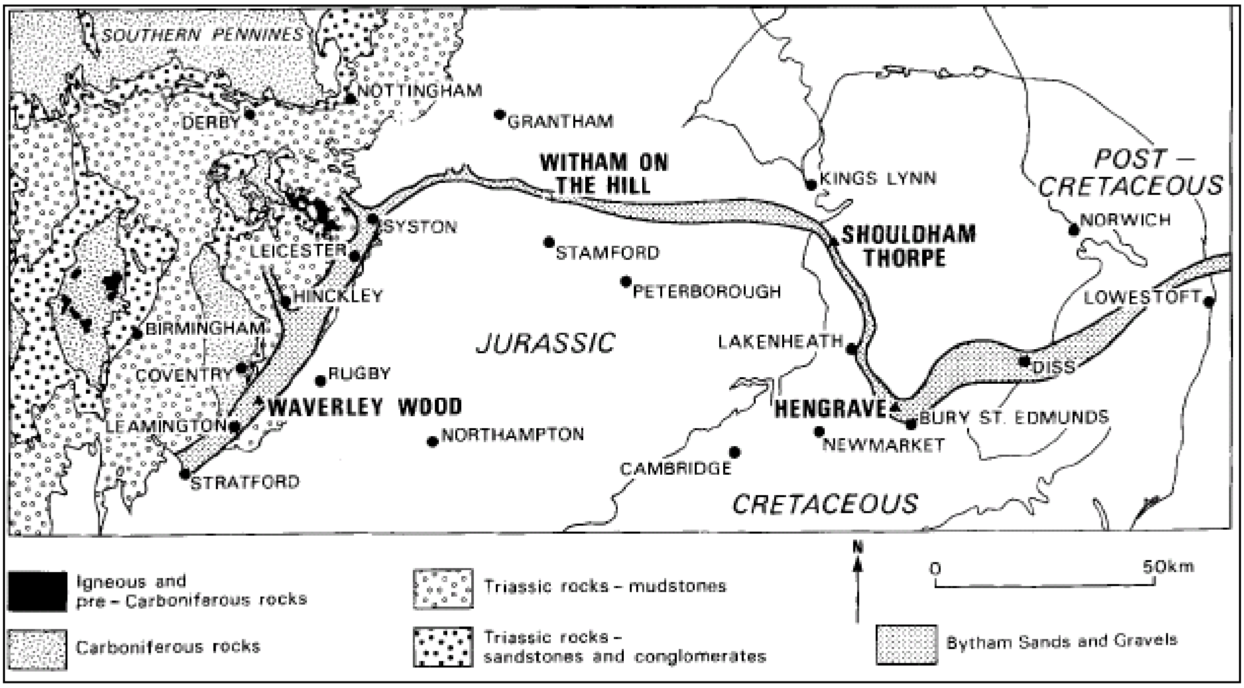


Figure 49. *Location of ancestral River Bytham as demonstrated by Bytham Sands and Gravels* (Bateman and Rose 1994, 33)

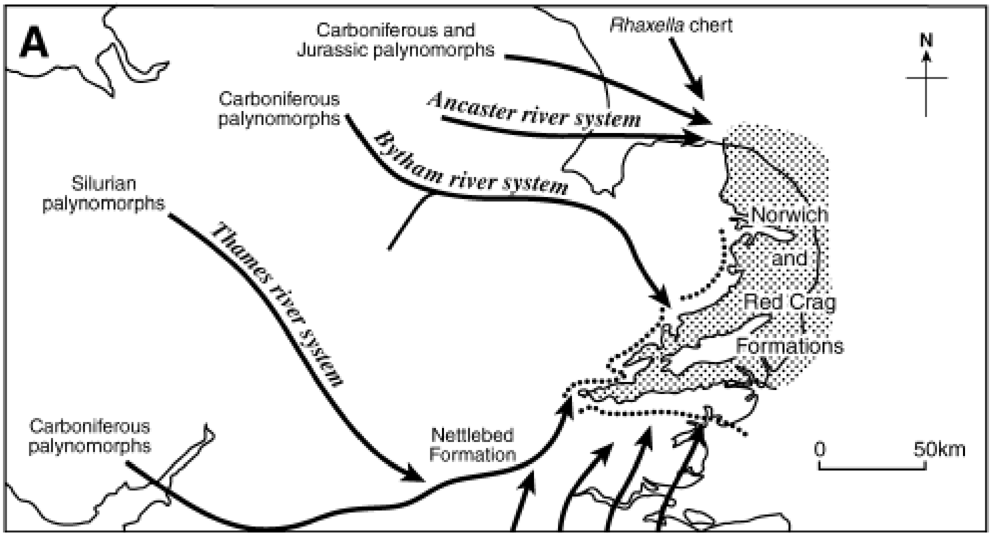


Figure 50. *The location of the ancestral Thames and Bytham River systems* (Rose 2001, 8)

Holocene deposits rest variously on chalk, till and unconsolidated sands and gravels, but the shape of later deposits through to the current topography, including the thickness of the Holocene sediments can be largely contributed on the elevation of the underlying chalk (Briant 2005). Holocene deposits occur in a west to east trough, thickening seawards, as defined by the seawards trending surface of the chalk (Briant 2005) associated with the northern margin of the London-Brabant massif (Chroston et al 1999). Due to the long lateral stability of the river Waveney, this landscape is dominated by pre-Devensian sediment bordering the inland-thinning Holocene infill of the Waveney floodplain. Investigations into the stratigraphy of this region, therefore, most often focus on either the pre-Anglian and Anglian deposition of older sediment or on the Holocene sequences of small stretches of the river systems flowing through this region. There is very little integration between these projects, and none which consider the impact of the palaeogeographic texture of this region on Mesolithic communities.

Methods

Geological Data and Modelling Process

Having identified the Waveney valley as an optimal location for micro-scale work and framed a generalized understanding of the region's geology, a methodology for creating an archaeologically meaningful model was required. To most usefully contribute to the record of the Mesolithic in this region, a comprehensive database of geological information was collated. While there was a large body of literature on the composition of the Waveney Valley stratigraphy, there had not yet been a digitized amalgamation of this research, and very little effort had been made to integrate early Holocene data across projects. The interpreted stratigraphy from core samples was varied. Therefore, a standardized nomenclature for the stratigraphic sequence was constructed using the most widely applicable labels for each unit. The borehole records were then evaluated and entered into RockWorks geological modelling suite and location data for each record was entered into a GIS. A model of the pre-Holocene land surface and models of the infilling Holocene sediment were then constructed using both RockWorks and ArcGIS.

Data sources

To create the most rigorously complete model of the Waveney valley geology, both published and grey literature resources were consulted for data. Boreholes were collated from journal papers, unpublished PhDs, the Suffolk River Valleys (SRV) project and the British Geological Survey (BGS).

<u>Alderton (1983)</u>

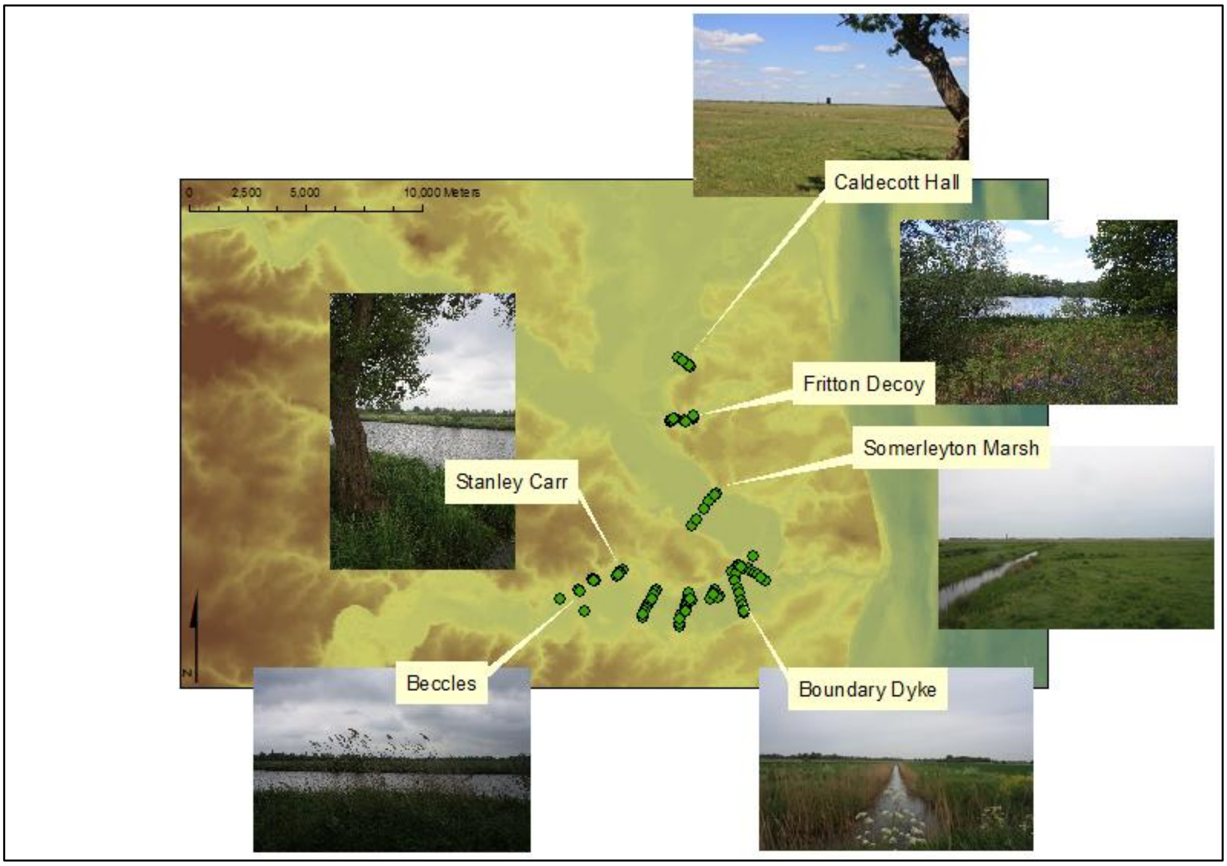


Figure 51. *Location of Alderton's (1983) cross-sections with photographs highlighting key sites mentioned in text*

A network of 120 boreholes forming 17 cross-valley sections were collected as part of Alderton's (1983) doctoral work at the University of Cambridge. The records from this work comprise a large majority of the information available on the Breydon Formation as no other research efforts have conducted spatially regular sampling through the River Waveney accommodation space. Where possible, these sections were located at approximately regular intervals down the Waveney Valley from Beccles to Great

Yarmouth. Downstream from Wheatacre Marsh, cores were limited to areas east and south of the River Waveney due to the difficulty of access and the thickness of the sediment in this more coastal extent. These boreholes were presented in Alderton's (1983) dissertation as a series of fence diagrams depicting core lithology and drawn to scale. The lateral accuracy was limited by the co-ordinates given in OS national grid at a 10m grid resolution. Five boreholes, taken from Stanley Carr, Boundary Dyke, Somerleyton Marsh, Fritton Decoy and Caldecott Hall, were subjected to palaeoenvironmental assays and radiocarbon dating, and therefore had detailed lithological records included in the dissertation.

Alderton (1983) collected core samples predominately through hand coring by Hiller peat sampler, which she estimates to have an accuracy of +/- 0.01m (1983, 9). Sediments were sampled at 60cm intervals, allowing a 10cm clearance for the screw (Alderton 1983, 53). The Hiller was found to be operative to a depth of around 12 metres. The six cores selected for palaeoenvironmental analysis and radiocarbon dating were extracted using a hand-operated 2-inch piston sampler with a square rod, stationary piston and lightweight aluminium rods with screw attachments for extension. Continuous 1m long cores were obtained in this way (Alderton 1983, 53). Where a piston corer was applied, an error margin of +/- 0.02m was estimated (Alderton 1983, 9 after Shennan 1987). In both cases, following from Shennan's predictions (1987) a maximum vertical deviation of 5° from perpendicular can introduce an estimated error of 0.4cm/m. At Stanley Carr 6, the unconsolidated fen deposits were too soft and compressible to be sampled by coring techniques and were therefore sampled through monoliths taken from a 2m*1m*1.25m pit. In this free face excavation vertical error was considered to be minimal. Samples obtained with the Hiller were described in the field while those collected with the piston corer were described in the lab, both using the Troels-Smith system (1955). Boreholes were levelled to benchmarks given in Ordnance Survey listings by used of a Hilger and Watts "Quickset" level (Alderton 1983, 54). Height data was referred to the 3rd Geodetic levelling of England and Wales and related to Ordnance Datum Newlyn (Alderton 1983, 54). Errors in the levelling of sample sites to OD were minimized by the use of closed circuit traverses with an accuracy of +/- 0.01m achieved (Alderton 1983, 9).

Coles (1977)

Coles' (1977) doctoral work at the University of East Anglia (UEA) preceded and influenced Alderton's (1983) with the collection of boreholes from the Yare valley along regular cross-sections which were subsequently further extended throughout the early 1980s under the auspices of the UEA. These borehole records, now stored with the British Geological Survey (BGS), contributed heavily to the data used in the northern extent of the modelled landscape. Coles (1977) and Coles and Funnell (1981) used a Petersen grab which proved sufficiently heavy to penetrate the muddy bottom sediment present in most areas he sampled. Where sandier sediment was present in Yarmouth Harbour, a much heavier Van Veen grab was used; other locations were sampled with a tubular corer attached to a 15' long extension handle. Samples of the mud flats and marsh sites in Breydon Water were cored with a short length of 70mm diameter metal tubing (Coles 1977, 324). Boreholes into the Upper and Lower Clay were made with a Hiller-type auger, like that used later by Alderton. The lateral accuracy of borehole locations is presented as +/-10m.

Suffolk River Valleys Project

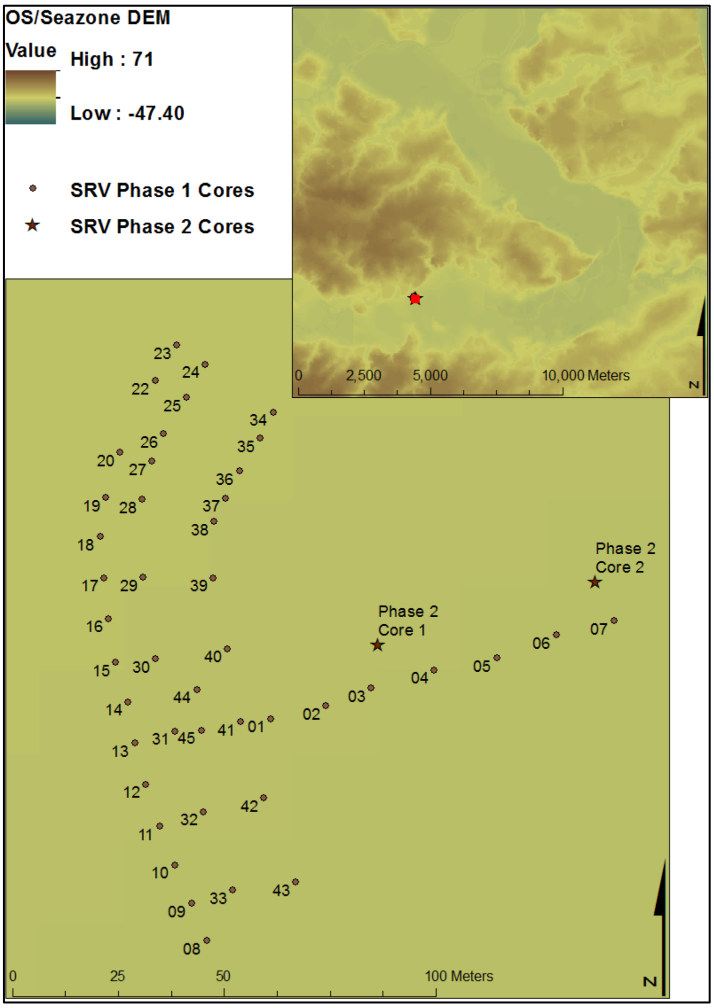


Figure 52. *Location of SRV cores taken at Beccles following from Hill (2008)*

The Suffolk River Valleys (Hill 2008) Project, conducted in two phases from 2006 to 2008, was commissioned to characterize the palaeoenvironmental and geoarchaeological potential of the rivers Waveney, Little Ouse, Lark, Gipping and Black Bourne. This characterization was to work in conjunction with the Aggregates Levy Sustainability Fund which had previously addressed the quantification of the archaeological remains in these river valleys in order to assess the impact of past, present and future aggregate extraction in Suffolk.

In the Waveney Valley, the SRV project focused on a 1km stretch on the southern, seaward bank of the river in Beccles, a site selected with a combination of aggregate extraction history, Historic Environment Record (HER) data, aerial photography analysis and LiDAR analysis. Beccles is primarily known for its Bronze Age archaeological material, yet also offered good stratigraphic preservation for palaeoenvironmental and geoarchaeological study. In Phase I of the SRV project, a total of 46 cores were extracted in Beccles and samples were taken for palaeoenvironmental assessment; beetle, pollen and diatom (Hill 2008). A coring transect of seven cores was established running east from a previous Bronze and Iron Age archaeological excavation. Three further transects of 10-16 cores were excavated running approximately north-south parallel to the flood plain embankment of the River Waveney. Cores were initially taken at roughly 20m intervals surrounding the former excavation site. However, for the first of the three transects running parallel to the Waveney embankment, the interval was reduced to 10m. All cores were levelled to surface elevations varying from -0.10m to -0.50m. Two additional cores were collected for pollen, beetle, and diatom assessment and radiocarbon dating. These cores were selected due to the significant variation in the stratigraphic archive found with increasing distance north along the River Waveney. The first, Beccles Core 1, was taken near the earlier archaeological excavation, at the site of Core 46, where the stratigraphy consisted primarily of brown, well-humified peat. The second, Beccles Core 2, was taken further north, at the original location of Core 21, where organic-rich silts and clay overlay the peat. Phase 2 of the SRV project at Beccles was primarily conducted to carry out radiocarbon dating, as no further palaeoenvironmental analysis was deemed necessary. Machine trenching was carried out for two cores, at a distance of ~50m and ~100m along a transect trending east from the original Beccles Core 1, this was to ensure that the upper sedimentary sequence had not been affected by post-depositional agricultural disturbance. Monolith tins were then used to sample the stratigraphy in-situ down to the base of the trench. Below the machine trench, a Russian Corer with a 0.05m chamber diameter was used to extract further samples. Core samples were taken in .50m sections to the University of Birmingham for dating. The full borehole records, palaeoenvironmental analyses and results of the radiocarbon dating were then made available in a combined Phase 1 and Phase 2 grey report (Hill 2008).

British Geological Survey

By far the most extensive dataset, the borehole samples collected from the British Geological Survey (BGS) also had the greatest diversity of collectors and quality of information. Access to the full archive of the BGS national borehole database was kindly provided during a three-day site visit to the headquarters at Keyworth in Nottingham. The depth of these boreholes ranged from a few centimetres to >100m, by far the deepest dataset, coring in some cases into the Upper Chalk bedrock. Information is available for neither the collection methodology nor for the vertical accuracy of lithostratigraphic change depths. The lateral resolution varies between +/-10m and +/-100m, though was most commonly recorded as the former. In many instances the height above OD of the borehole top was not recorded. Therefore, the boreholes were plotted on an Ordnance Survey collection Digital Terrain Model (DTM) in ArcGIS and borehole elevations were determined from the z value of the associated pixel. The quality of information ranges from a detailed lithological description and interpretation into stratigraphy to an unelaborated lithological or stratigraphic listing. The majority of boreholes records used described colour, texture and sediment type at a 1cm vertical precision.

BGS boreholes used in this study were selected from a broader national dataset based primarily on practical constraints introduced by the density of data available. While the BGS data was extensive between the Rivers Waveney and Yare, this density was substantially diminished south of the Waveney Valley. Data collected by Alderton (1983) and Coles (1977) was limited to the Waveney and Yare Valleys respectively. The Alderton (1983) dataset ran only as far inland as Beccles, providing a western limit to the study area. As the River Waveney was the focus of this micro landscape scale study, the BGS and Coles datasets were constrained to match this inland limit. The established post-LGM stability of the landscape between the Rivers Yare and Waveney indicated the suitability of this study for a Mesolithic investigation, allowing constrained modelling of the aggrading Holocene sediment concurrent with known Mesolithic artefact scatters. Alderton's (1983) study applied Beccles as the inland extent as this was seen to be the upstream limit of the influence of early Holocene inundation in the Waveney valley. Therefore, in maintaining a coastal, early Holocene focus, this inland extent, showing a change in landscape susceptibility to the rising North Sea, provides a coherent perimeter on the micro scale. The creation of a rectangular spatial focus was mandated by the RockWorks software suite which was used to collate and graphically display the borehole records. A larger rectangle encompassing the landscape between the Waveney and Yare valleys, from 637000E, 289000N to 656000E, 310000N on the British National Grid, was therefore applied with the intention of clipping any graphical outputs to reduce edge effects and data artefacts after the creation of modelled surfaces. In total, ~1340 borehole records were collated from the BGS and entered into the borehole database.

Journal Papers

While the information derived from published articles on the Waveney valley was important to framing the context of this micro-scale project, the majority of the borehole records referenced in these papers were either available in full through the BGS service or were collected as part of the projects discussed above (Alderton 1983, Coles 1977, Hill 2008). Two notable exceptions to this were papers from Brew (1992), written in conjunction with Funnell who contributed to Coles (1981) work, and Horton (2004). Brew's (1992) paper was derived from his earlier (1990) PhD work at the University of East Anglia, which was conducted in the lower River Blyth estuary, south of the micro-scale spatial focus determined by this dissertation. However, since all twelve of the boreholes excavated by Brew were radiocarbon-dated, these records were included to contextualize discussions of age-versus-depth in the wider landscape. Similarly, Horton's (2004) paper primarily references borehole data collected by Alderton (1983), Brew (1992) and Coles (1981), but adds two more dated core samples to the record, both located north of the spatial focus which have been used to create a larger range of dated core samples from the surrounding landscape.

Offshore Cores

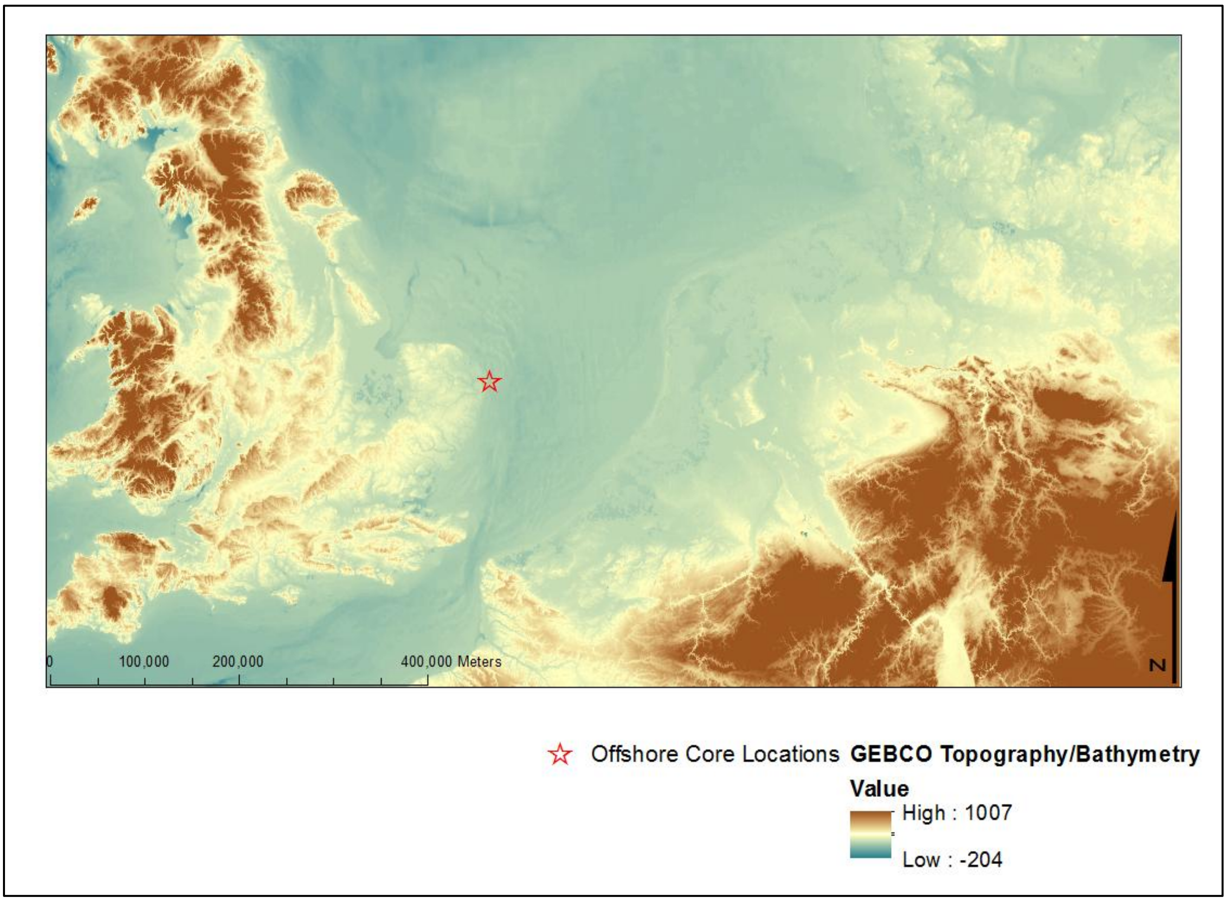


Figure 53. *Location of offshore cores collected by Wessex Archaeology's seabed prehistory project*

The modern coastline creates an artificial eastern boundary due to lack of offshore borehole data in this region. BGS offshore cores were considered, but were too far to the north and south of the Waveney Valley to have any significant bearing on the model. Cores taken as part of the various Dogger Bank studies are situated in Region VII, a landscape experiencing different isostatic patterns to Region V. Boreholes from the Wessex Seabed Prehistory project were the most promising for a useful bearing on the Waveney study but were too far from the onshore cores to create a meaningful inclusive model. However, had there been cores collected from the intervening space, these boreholes would have provided an interesting comparison between the currently terrestrial and currently submerged stratigraphic sequences. It would have been my strong preference to continue any modelling and analysis across the current coastal divide to create a single surface interpretation for this landscape. Therefore, the nine cores available from the Wessex Seabed Prehistory Area 240 project taken offshore from the Waveney valley were included in the borehole database collated for this dissertation. These cores were collected with a 6m vibrocore as part of a larger scheme of geophysical data collection. As with Alderton's boreholes, the stratigraphy of these cores was interpreted on a unique system of Units 1-4. Unit 1 is a sand and gravel layer, interpreted as part of the shallow marine Yarmouth Roads Formation deposited during the Cromerian Complex. Unit 2, comprising silts, sands and gravels, is suggested to have been deposited during the Wolstonian period. The sands, silts and clays of Unit 3 are indicative of sea level rise and climate amelioration with forming freshwater and estuarine environments. OSL dates from this stratigraphic layer related to the Ipswichian period. Unit 4 is indicative of Holocene seabed sediments and comprises gravels and sands.

Summary of Borehole Data Used

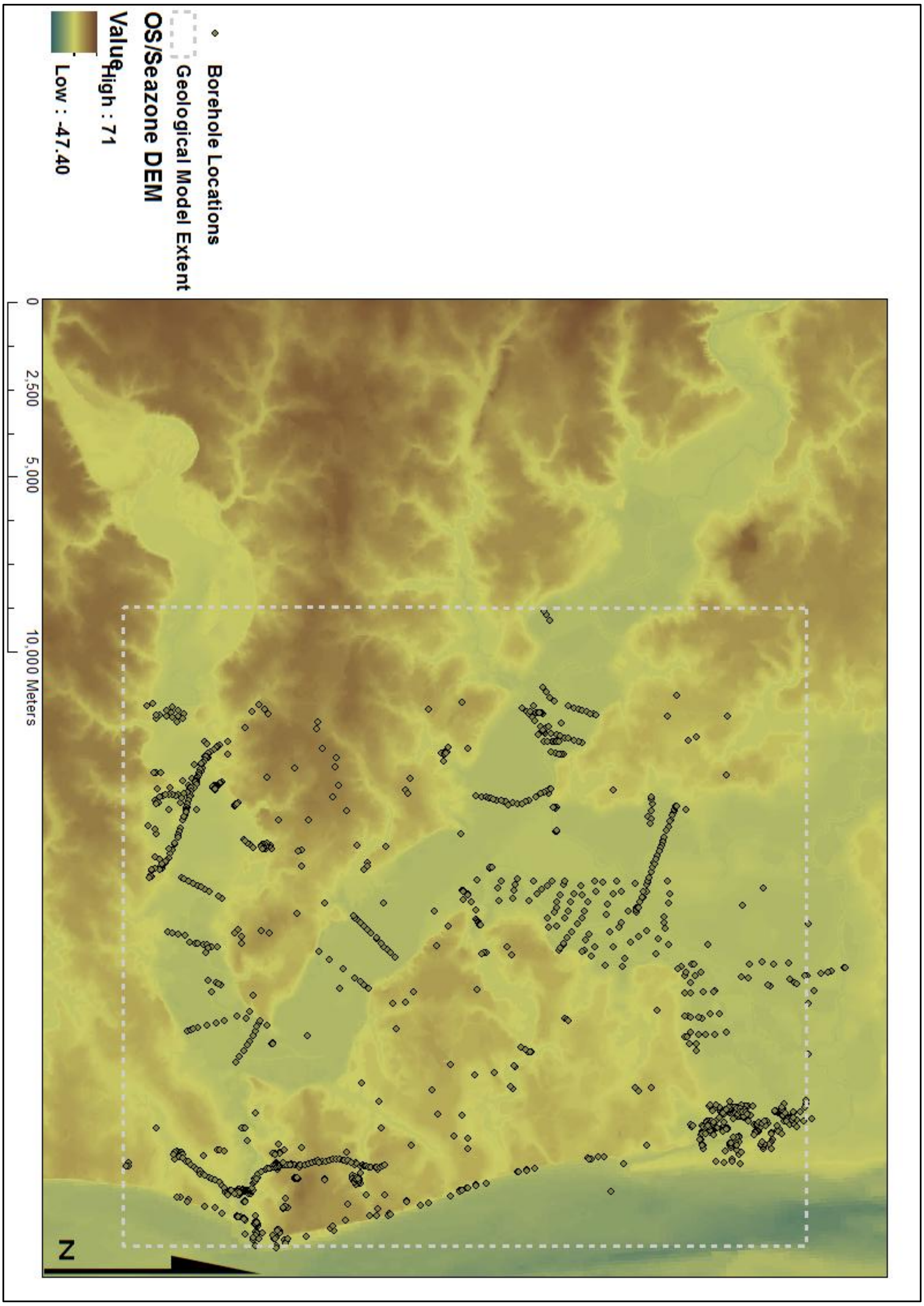


Figure 54. *Map showing all 1444 boreholes collated for modelling of the Waveney landscape geology*

Approximately 2000 cores from the 21km by 19km rectangular study area were considered. Of these, 1444 borehole records were used for modelling. The vast majority of records discounted were from the BGS archive; these proved to be unusable for stratigraphic modelling due to insufficient information. These records, which either failed to provide location information, or more often, had no associated lithological details and merely noted the depth of 'Drift', offered inadequate data for the higher resolution aims of this model. Others which were discarded were so shallow as to only record Topsoil. While these elevations would have been invaluable had surface topographic information been unavailable, a Digital Elevation Model was obtained from the Ordnance Survey, affording a more even coverage over the extent of the study area.

A total of fourteen cores with associated radiocarbon dates were collated, though only nine of these are located inside the study area rectangle. Those outside were used to provide contextual age-depth information where appropriate. Offshore, nine boreholes were modelled independently to provide a comparison between submerged and terrestrial stratigraphic records and to mitigate the unsuitable fracture in modelling provided by the change of data density at the modern coastline.

Site Visit

Before beginning the modelling process, during the initial stages of data collection, the field sites of Alderton's (1983), Coles' (1977) and the SRV's projects were visited. This trip offered firsthand experience of the current space around the river Waveney. Locations of the largest lithic scatters documented in the archaeological record were also seen. A photographic archive of the current state of these sites and the locations of borehole transects was created. By building a more intimate understanding of the location and associated constraints of the cross-sections, the process behind the positioning of Alderton's site selection became much clearer than it could be from the text or even from aerial photographs. These transects appear to have been located within fields and marshes with optimal road access and where a clear line-of-sight could be established to confirm the GPS-measured location of each core. The context of even the largest lithic scatters forcefully highlighted the loose nature of their location. Situated within farmers' fields and on roadside verges, none of the Mesolithic artefacts recorded from this region was discovered through excavation. The possibility of field-walking exercises, while considered as a source of potentially invaluable additions to the artefact record, was, after this field trip, discounted as an inefficient use of time for the primary aims of this project. By using the extant archaeological resource as described below, Mesolithic use of this landscape could be established and lithic scatters spatially analysed without detracting from the central goal of modelling and interpreting the texture of the early Holocene environment experience by these communities.

While the collection of further boreholes was initially deliberated upon, the site visit in conjunction with the initial plotting of existing borehole records into ArcMap allowed a better understanding of the limited opportunity for taking useful additional cores. One region where supplementary cores may have been a valuable contribution to the record was on the wet-to-dry land edge of Waveney valley, especially in continuation of Alderton's (1983) cross-sections. This would have allowed for the modelling of the sharp transition from Waveney floodplain to higher land less affected by infilling Holocene sediment in the river valley. Caldecott Hall, Somerleyton Marsh and Boundary Dyke cross-sections were judged to be particularly interesting locations for this work; Caldecott Hall due to Alderton's (1983) descriptions of maritime influence in the Holocene sequence, Somerleyton Marsh due to the location of large nearby (0.5km) Mesolithic artefact scatters and Boundary Dyke due to the change to a more protected Holocene sequence described by Alderton (1983). However, after meeting with landowners and examining the current land use, these cross-section extensions proved to be impossible. At Caldecott Hall, the depth of early Holocene sediments under recent sediment accumulation reduced access to useful data, while at Somerleyton Marsh a functioning train station lies across the end of Alderton's (1983) cross-section. Dispute over land ownership at Boundary Dyke made it prohibitively difficult to obtain permission to extend this transect. Additionally, the number of cores collated from the present borehole record limited the importance of contributing more data points to the study area to be modelled. Therefore, the modelling process was begun using the extant borehole database.

Creating a Standardized Nomenclature

The degree of variety in the projects sourced for borehole data meant that no single stratigraphic sequence for the full series had been established. While Coles (1977), Alderton (1983) and the Suffolk Rivers Valley Project (Hill 2008) focused primarily on shallower, Holocene sediments, many of the boreholes from the BGS collection cored down to Upper Chalk. These cores were vital to establish the underlying geology which structures the shape of the Holocene infill. Coles (1977) and Alderton (1983) propose different categorizations of the Holocene material, and the BGS as an institution does not currently suggest a position on this debate. Of those BGS boreholes with associated stratigraphic sequencing, several different systems have been applied. In order to integrate the borehole data between projects, a standardized nomenclature therefore became essential. It was the goal of this project, then, to derive a sequence that provided a best-fit with the broader geological literature from this landscape, and would thereby be most applicable to the wider Region V context. Descriptions of the key geological units seen in the collated boreholes and their role in the Waveney valley stratigraphy have been discussed below. These descriptions are vital as a means of understanding the palaeogeological textures implied by the modelled surfaces created from the borehole database.

Key Units

Chalk

Declining in height from south-west to north-east and dipping irregularly to south-east (Allen 1982), Upper Chalk underlies the region entirely (Moorlock 2000, 10). The thickness of the entire Cretaceous Chalk Group is ~320m in the south of the Waveney valley and ~420m near the mouth of the River Yare, most of which is Upper Chalk, with the Middle and Lower layers showing an estimated thickness of only 12-15m (Arthurton 1994, 17). The principal lithology is white, micritic, coccolith limestone, variously firm to soft, with frequent flint nodules (Bristow 1983), showing similarities with Chalk found in southern Britain (Arthurton 1994, 17). Where the London Clay Formation is preserved, true in forty-nine of the boreholes used in modelling, the erosion surface at the top of the Chalk dates to the Palaeocene. Where the Crag rests directly on the Chalk (23 out of 35 boreholes recording Chalk), the erosion surface is of a late Pliocene or early Palaeocene age (Arthurton 1994, 18). Direct contact with Crag formations often leads to brown staining in the upper few centimetres of the Chalk. In the Yare valley, Anglian glacial deposits, Lowestoft Till, are reported to immediately overlie the Chalk (Wood 1988, Cox 1985).

London Clay

The Eocene London Clay, overlying the Upper Chalk in 49 of the deeper boreholes used in the models, has less available information on its nature and distribution in East Anglia (Moorlock 2000, 21). Where it is present, it is represented by thick sequences of brown or blue clays, and may have a fuller expression offshore (Moorlock 2000, 21). The majority of information known about this layer is from boreholes near, and just offshore, the North Sea mouth of the River Waveney, arguing its importance to understanding the stratigraphic sequence of this valley. Two distinctive units have been recognized at the base of the formation; Hales Clay and the Harwich Member, with a no overlying unit referred to as the Walton Member (Arthurton 1994, 27). The Walton Member, represented in the Great Yarmouth boreholes, is a stiff brown to blue-grey, laminated silty clay (Arthurton 1994, 27).

Crag

Overlying either London Clay or directly the Upper Chalk, the Crag Group is the stratigraphic representations of deposits from the ancestral Bytham River from the last Pliocene and early Pleistocene (Rose 2001). Crag is recorded in 471 of the cores collated for modelling. With an extensive body of literature through from the early 1800s, this sandy marine stratigraphic layer, first used as a dialectic term in East Anglia and adopted into geological terminology by Taylor (1824), is fundamental to the geology of the Waveney valley. These sediments accumulated near the western margin of the then rapidly subsiding North Sea, the margin of which was a few kilometres west of the current coastline (Arthurton 1994, 30). In East Anglia, unlike the much deeper equivalents in Regions III, VI and VII, Crag formations do not exceed 70m in thickness, the thickest of which has been recorded at Ormesby Borehole, on the coastal margin in the north of Region V (Arthurton 1994). The older Red Crag, dating to the very late Pliocene through to the early Pleistocene, underlies Norwich Crag which is more commonly seen in the study region. The lithology of Crag formations is a shelly marine sand with interbedded clays.

Certain beds within the overlying Kesgrave and Bytham Formations resemble parts of the Crag, leading to a difficulty in distinguishing the two where other indicators are absent

(Arthurton 1994). The Crag Group dominantly comprises fine-to coarse-grained micaceous sands (Moorlock 2000, 31). Weathered Red Crag deposits are often described as 'reddish' with brownish clay intercalation, though are often indistinguishable from Norwich Crag; thus the amalgamating terminology 'Crag Group' (Bristow 1983). Where Red Crag directly overlies Upper Chalk, there is commonly a basal bed up to 2m thick of pebbles and cobbles of glauconite-coated flint (Moorlock 2000, 31). Red Crag comprises poorly sorted cross-bedded medium to coarse grained shelly sands with a gradual upward coarsening trend (Mathers 1988). Norwich Crag, also called Fluvio-marine Crag (Lyell 1839) and Iceneian Crag (Harmer 1899) is, in its unweathered state, usually described as 'dark' or 'greenish', or even 'blue' or 'black' as a manifestation of the abundance of glauconite within the sediment. However, where weathered, the sands are yellowish to brown in colour and yield a light sandy soil, often with ferruginous concretions (Moorlock 2000, 31). The greenish-grey expression of Norwich Crag is often represented in the Waveney Valley from Beccles to Lowestoft (Hopson 1991). Norwich Crag comprises a widespread sheet of well-sorted fine to medium grained sand, locally including Chillesford Clay beds and rarely gravel Westleton Beds (Mathers 1988).

Regionally, the Crag Group has been tilted up to the west at about 1m/km (Mathers 1988). Two north-easterly trending depressions on the base of the Crag, one through Bungay and the other through Leiston and Southwold, lead to considerable variations in the thickness of this group (Moorlock 2000, 28). Red Crag is only known in areas where the Crag Group is thick, notably in the Stradbrok Trough and in the area from Aldeburgh to Southwold (Moorlock 2000, 30).

Kesgrave and Bytham Formations

Above the Crag Group, lies a pebbly series variously recorded in 182 boreholes from the Waveney study area as 'Pebbly Series', 'Kesgrave Formation' and 'Bytham Terrace Formation'; 'Pebbly Series' being the most descriptive of the alternately sandy and gravelly or pebbly lithology. This suite of quartz- and quartzite-bearing sands, gravels and silts is present beneath Anglian glacial deposits through much of Region V and was originally (Prestwich 1871) confused with the flint gravels of the Crag Group. Rose et al (1976) coined the term Kesgrave Sands and Gravels, from a type site in the Gipping Valley, south of the Waveney, and showed these sediments to be of fluvial origin, representing early terraces of the River Thames. Within the Waveney landscape, however, it is difficult to distinguish between those sands and gravels deposited by the ancestral River Thames, the Kesgrave Formation, trending to the south, and those laid down by the ancestral River Bytham, the Bytham Formation, trending to the north (Bateman and Rose 1994, Hopson 1987). They are differentiated based on regional variations in the main gravel constituents of flint, quartz and quartzite. The Kesgrave Formation is described as far north as Lowestoft, where as the Bytham Sands and Gravels are demonstrated in the Upper Waveney valley. Neither group can be subdivided in the Waveney landscape as is done in the Thames Valley (Moorlock 2000). The Kesgrave Group and Bytham Sands and Gravels lithology is yellow-grey, medium to coarse-grained poorly sorted, gravelly sand with pebbles up to 20mm diameter of subangular flint, subrounded quartz and quartzite (Moorlock 2000) and is primarily distinguished from the underlying crag by a change to the underlying finer-grained sand with fewer pebbly and gravel inclusions.

Corton Beds

At the start of the Anglian glaciation, the lower North Sea Drift was deposited and is represented in the Waveney landscape as the Corton Beds, an outwash lithofacies of the terrace sequence of the soon defunct Bytham River system (Lee 2004). This stratigraphic layer is synonymous with Mather's (1987) North Sea Drift, and is often recorded in British Geological Survey boreholes in the north of Region V as such. The deposits of the Corton Formation originated with the Anglian advance of the Scandinavian Ice Sheet (Moorlock 2000, 54). This bed is best expressed in the coastal sections of East Anglia, especially in the Waveney valley from Lowestoft to Great Yarmouth (Moorlock 2000, 54); inland this layer is not commonly seen. The dominant lithology, up to 15m thick, is that of well-sorted, fine- to medium-grained, locally clayey sand with pebbly facies. This sand is commonly greyish orange or yellowish brown, but olive-grey and other shades of yellow, orange and brown are recorded (Hopson 1987). In the Great Yarmouth district, the Corton formation exists in a continuous, single sheet inclining inland from 0 to 13m OD (Hopson 1987). This layer is, however, locally patchy to the south of the valley (Arthurton 1994). The base of the Corton Formation, the First Cromer Till (Banham 1971, Baden-Powell 1948) is the Norwich Brickearth (Hopson 1987, Arthurton 1994, Moorlock 2000). Found in the Norwich district in the north of the Waveney landscape, a single till sheet ranging from 3 to 6m thick, Norwich Brickearth is a very silty sandy clay or clayey sand, commonly laminated. This lithostratigraphic layer is consistently brownish grey to dusky yellowish brown in colour and is firm to stiff weathering rapidly to a soft and friable condition (Moorlock 2000, 57). Corton Beds are represented in 279 of the cores used in geological modelling in this dissertation; of these, 20 were specified as Norwich Brick Earth.

Lowestoft Till

Lying above the Corton Beds, the River Waveney is incised into the Lowestoft Till, formed during the Anglian disruption of the ancestral River Bytham. Found in 357 of the borehole records collated, the lithology of Lowestoft Till includes sandy and silty clays, loam, and the more pure Boulder Clay, and has historically been called Lowestoft Boulder Clay (Woodward 1881, Baden-Powel 1948, Bristow 1973). The till is a stiff, bluish grey, chalky, variably silty and sandy clay that weathers yellowish brown (Moorlock 2000). Within Region V, the lithology of Lowestoft Till is very uniform with minor difference in the fine-grained sand and silt fractions (Perrin 1973). This formation crops out in the upper part of the cliff section at Corton, and is extensive, but erratic over the Waveney landscape and may be absent in the northwest of this system. Its discordant relationship with the underlying glaciofluvial Corton Formation implies that the major dissection of the till sheet was initiated during the period of retreat of the Lowestoft ice sheet (Arthurton 1994, 60). In the Waveney Valley from Somerleyton to Corton, Lowestoft Till is the principal deposit, capping the plateau areas with a thin deposit >5m thick. In this region, the base ranges between 12 and 18m above OD with considerable local variation (Hopson 1987).

Cover Sand

Much of the upland area of the Waveney landscape is described as carrying a drape of silt or fine-grained sand that masks many of the outcrops; however, this layer is only recorded in 17 of the borehole records from the study area rectangle. This Cover Sand is often up to 1.5m thick with locally thicker deposits, especially at the bases of concave slopes (Arthurton 1994). No direct evidence of the age of the Cover Sand has been established within the Waveney Valley or surrounding context. Its accumulation postdates the formation of the Anglian Lowestoft Till and does not cover the first Holocene deposits of the Breydon Formation, therefore is attributed an expansive time range between the Hoxnian to Devensian (Arthurton 1994, 68). Catt et al (1971) suggested a wind-blown origin for this layer, similar to that attributed to a silty sandy cover deposit by Perrin et al (1974).

Terrace Gravels

Lying above the Lowestoft Till and found in 35 borehole records used in modelling, a gravel and subordinate sand formation underlies the Breydon Formation and occupies the floor of the buried valley systems of the Rivers Yare and Waveney (Arthurton 1994, 69). The deposits comprise sand and gravel ranging from fine to coarse, with variable amounts of flint and are often found resting directly on the Crag Formation. Cox (1985) has suggested that these deposits were formed in the late Devensian and consist of fluvial sediments deposited by these two river systems. However, especially where in direct contact with underlying Crag, this Terrace Gravel formation has been persistently difficult to distinguish since first noted in the 1800s (Woodward 1881, Arthurton 1994). In the Waveney Valley, this Terrace Gravel can be split into three river terraces, the oldest Homersfield deposits, the Broome Terrace and the youngest Floodplain terrace (Moorlock 2000, 68). The Homersfield Terrace is the highest and forms a distinct but irregular topographical bench rising to about 6m above the present floodplain, with a maximum height several metres above this (Moorlock 2000). The Broome Terrace forms a bench at 2 to 4m above the floodplain (Mathers 1993). The Floodplain Terrace is the most extensive and forms intermittent low benches and mounds within the Waveney floodplain, rising to a height of about 1m above the Breydon Formation alluvium.

The Breydon Formation

After the Devensian deposition of Terrace Gravels, came the post-LGM rapidly-rising sea-levels considered in this dissertation which led to the formation of the main unit of analysis important for modelling the Mesolithic landscape of the Waveney valley. The rising North Sea waters led to inundation and reclamation of the Waveney landscape and the deposition of what was initially classed ‘Alluvium’ (Woodward 1881, Blake 1890). The clays and peats of this early and middle Holocene infill have more recently been grouped into the Breydon Formation (Jennings 1951, Coles 1977, Coles and Funnell 1981, Alderton 1983, Brew 1990 and 1992, Arthurton 1994, Moorlock 2000, Westaway 2009). The depth of the Breydon Formation in the Waveney landscape ranges from 8m around Beccles to 25m towards the coastal edge. The pre-Holocene landsurface is noticeably higher in Fritton Decoy than it is in the main valley, leading to shallower alluvium depths. While primarily composed of clays and silty clays, the local inclusion of sands can complicate the differentiation of Holocene infill from earlier glacial deposits (Briant 2005).

Jennings (1951) first divided the Breydon Formation into five component stratigraphic members, the Lower Peat, Lower Clay, Middle Peat, Upper Clay and Upper Peat. This has become the best established classification of the Waveney Alluvium, but was contested by Alderton (1983). She argued that the range of sedimentation from sand to silt to clay undermined the designation 'Clay'. More importantly, on the basis of the Waveney boreholes collected during her doctoral work, she noted the rarity of the presence of the entire sequence in a single location and describes a difference between the sequence common upstream and that found further downstream. Therefore, she offered an alternative classification based on the sequence in the upstream type-bore Stanley Carr 6 (TM 4404 9298) and that at the downstream type-bore Boundary Dyke 8/2 (TM 4890 9258). The Stanley Carr borehole demonstrated the sequence Aldeby Peat Bed, equivalent to Middle Peat, Breydon Bed, equivalent to Upper Clay, Stanley's Carr Peat Bed, equivalent to Upper Peat, with neither Lower Clay nor Lower Peat showing a substantial presence in this area of the Waveney valley. Alternately, the Boundary Dyke sequence has no evidence for Upper Peat and begins with the Barnby Peat Bed, equivalent to Lower Peat, the Oulton Bed, equivalent to Lower Clay, the Burgh Peat Bed, equivalent to Middle Peat, and finishes with the Breydon Bed, equivalent to the Upper Clay. This system avoids potential confusion caused by a lower, middle, or upper designation in a sequence where the layers to the top or bottom are not evidenced, but it is entirely restricted to the Waveney Valley in its terminology. Especially in the Waveney river system, which merges with the Yare and the Bure before emptying into the North Sea, this extremely localized terminology introduces its own complications. Therefore, this project will work with the better-established classifications despite Alderton's valid critiques.

				Alderton 1983 (Waveney)						
	Woodward 1881 Blake 1890	**Jennings 1952 (Bure)**	**Coles 1977 (Yare)**	**Stanley Carr - SC 6**	**Boundary Dyke BD 8/2**	**Brew 1992 (Blyth)**	**Arthurton 1994, Moorlake 2000 (Waveney)**		**Westaway 2009 (Waveney)**	**SRV 2008**
Waveney Valley Formation	Alluvium	Upper Peat	Upper Peat 1500BP	Stanley Carrs Peat Bed			Upper Peat	Breydon Formation	Upper Peat	Upper Peat 2015-2130BP
		Upper Clay	Upper Clay 2000BP	Breydon Bed	Breydon Bed 2600-1700BP	Upper Clay 4300BP	Upper Clay		Clay	Upper Clay
		Middle Peat	Middle Peat 4500BP	Aldeby Peat Bed	Burgh Peat Bed 4970-4300BP	Middle Peat 4500BP	Middle Peat		End Early Holocene Middle Peat	Middle Peat 4765-5060BP
		Lower Clay	Lower Clay 7500BP		Oulton Bed 7650-5150BP	Lower Clay 6500BP	Lower Clay		Clay	Middle Clay
		Lower Peat	Lower Peat		Barnby Bed 8900BP	Lower Peat 6750BP	Lower Peat		Early Holocene Basal Peat	Lower Peat 7720-8460BP

Table 3. *Chart comparing the available descriptions of the Breydon Formation sequence in the Rivers Waveney, Yare and Bure*

Lower Peat

Present in 51 of the borehole records used in this study, the Lower Peat of the Waveney landscape is a thin and impersistent layer which is entirely buried (Moorlock 2000). The upper and lower boundaries are diachronous along the Waveney and its altitude changes with its basal surface rising from -19.5m OD at Great Yarmouth to -9.5m OD at the inland limit, with only slight thickening in this direction to a maximum of 1.5m (Alderton 1983). Its impersistence is possibly due to erosion with the following marine incursion, leading to the formation of the Lower Clay. Alderton (1983) found Lower Peat to become increasingly localized in distribution downstream from Share Marsh II where it is then best developed on the floor of the incised channel. By Yarmouth, she found that it is confined to the deepest points of the Channel. Jennings (1953) also noted the infrequency of lower peat in the Bure Valley to the north where this layer is confined to a deep narrow channel incised into the shallower, level floor of this valley. Coles (1977) notes that this thin layer was often not present in boreholes even where the valley floor may have been deep enough to permit its formation. This scarcity makes its original composition difficult to ascertain (Moorlock 2000). Where found, this peat layer is always dry, compressed and humified (Alderton 1983) and comprises woody peats passing up into fen and reed swamp peat through to salt marsh vegetation (Moorlock 2000). Alderton (1983) dates this lowest Holocene layer to 8500BP at Caldecott Hall, the deepest and most seaward of her dated sequences, though this date was not taken at the base, so is not a maximum beginning date of formation. Lower Peat formation at this site had ceased by 7500BP, but continued until 6300 at her type-bore of Boundary Dyke 8/2.

Lower Clay

The Lower Clay estuarine unit is also diachronous, rising from -19m OD at Yarmouth to -8m OD at the inland edge of this unit (Alderton 1983). This layer is represented in 315 of the cores modelled in this dissertation, a marked jump from the number of cores recording Lower Peat. It thins towards buried valley margins (at about 6m below OD) under Long Dam Level (Moorlock 2000) The regressive overlap is quite level between -6 and -7.5m OD and the recession of estuarine influence appears to have been a relatively rapid event, with the growth of the succeeding Middle Peat occurring throughout the valley at 4800BP (Alderton 1983). In the Bure Valley, Lower Clay, similar to the underlying peat layer is confined to the deep narrow channel (Jennings 1953). In the Yare Valley, it ranges from 12 to 14m in thickness, substantially thicker than in the Waveney Valley in the south of this landscape. It is thickest, with a sandy lower horizon fining upward to silt and clay, at the seaward margin where the Yare meets the Waveney (Coles 1977). Lower Clay presents as a soft grey-black clay which becomes firm with depth (Moorlock 2000). Inland, where this layer thins, it is represented by a stickier grey clay, commonly with Phragmites remains throughout (Coles 1977).

<u>Middle Peat</u>

Middle Peat is the most extensive of the Breydon Formation peats, found in 315 of the collated borehole records, and is usually well defined (Moorlock 2000, Alderton 1983, Coles 1977, Jennings 1951). However, it can be difficult to distinguish from the other peats where no Clay layers intercede. Occupying the full width of the Waveney, Yare and Bure Valleys, (Alderton 1983, Coles 1977, Jennings 1951) Middle Peat ranges from less than 1m to more than 4m thick, though can be thinner down valley due to dewatering and consolidation by the increasing thickness of the covering Upper Clay sediments (Moorlock 2000). The upper surface of this layer is eroded and, similar to the lower surface, most often comprises Phragmites, indicating transitions between estuarine and terrestrial conditions (Coles 1977). In the middle, Middle Peat is mostly brushwood peat grading to a structureless muddy peat near the coast, indicating a raised water table (Coles 1977).

<u>Upper Clay</u>

Present in 677 of the cores used in the geological models, Upper Clay forms the bulk of the Breydon Formation in the Waveney and wedges out against Upper Peat near Beccles and thickens eastwards to a maximum of about 8m (Moorlock 2000). Jennings (1953) found that at the seaward end of the Bure, the Upper Clay occupied the full width of the valley, but that it both thinned and became less laterally extensive farther inland. The particle size analysis showed that grain sizes of Upper Clay were greatest near the present river channel, whereas those of Middle Peat were noticeably greater away from the river (Jennings 1953). In the Yare, Upper Clay ranges from having a sandy lower horizon fining upwards to a fine sand near the coast, to a smooth clay with *in situ Phragmites* remains throughout at its inland extent (Coles 1977). In the Waveney valley above Gillingham, it becomes confined to the narrow channel which follows closely the course of the present river (Alderton 1983). Where exposed, Upper Clay has a weathered upper layer, generally less than 1m thick which comprises silty to very silty clay and is firm to very stiff (Moorlock 2000). Upper Clay is pale grey with distinctive tan mottling, concretions of brown iron oxide and commonly traces of gypsum, plant fragments and rootlets. Where unweathered it is a soft silty clay, pale to medium and rich in plant material, especially *Phragmites* rootlets in growth position, and sparse bivalve and gastropod shells. This unweathered clay facies can become very soft to liquid with a high silt content where it is dark bluish to brownish grey with black colouration due to finely disseminated pyrite mottling and flecks (Moorlock 2000). This second incursion of estuarine conditions, forming Middle Peat, was more rapid than the first, Lower Peat incursion, occurring in less than 500 years at 2000BP (Alderton 1983). The transgressive overlap is remarkably level over large areas, lying generally between -3.75 and 4.5m OD, except in eroded areas (Alderton 1983).

Upper Peat

Upper Peat, recorded in 127 of the collated borehole logs, is mostly confined to discontinuous outcrops at the marshland fringe and is well developed where freshwater springs issue into embayments, such as at Wild Carr (443 908), Long Dam Level (460 915) and Share Marsh (Moorlock 2000). In the Yare, it is only present in the undrained upper valley where the Upper Clay thins and close the sides of the valley seaward of here (Coles 1977). Similarly, Upper Peat is only found in the localized areas of undrained fen and carr where it is a surface organic bed. In the upper Waveney Valley it is quite common, covering sections at Alder Carr and Stanley Carr. Downstream it is increasingly restricted to the valley margin (Alderton 1983). This peat layer presents as a reed, especially *Phragmites*, and sedge, both *Carex* and *Caladium*, peat with some brushwood peat. When supplied with artesian water in areas raised above the marshland surface, it is characterized by *Sphagnum* (Moorlock 2000). Upper Peat formation began in the inland areas at 1750BP (Alderton 1983).

Summary of Sequence

As the Holocene infill, the forming sediment of the Mesolithic period, is reported to sit inconsistently on several different stratigraphic layers, a single contact layer could not be determined as an appropriate cut-off point for data used for geological models in this dissertation. Upper Chalk as the deepest geological unit recorded by the boreholes collated in this study, providing the underlying structure of the later stratigraphic units, was designated as bedrock. Therefore, the stratigraphic sequence begins with the Cretaceous Upper Chalk, overlain with Eocene London Clay, the last Pliocene and early Pleistocene Crag Groups, Pre-Anglian Kesgrave and Bytham Sands and Gravels, the Corton Beds of the earliest Anglian including Norwich Brick Earth, the Anglian formation of Lowestoft Till, post-Anglian Cover Sand, Devensian Terrace Gravels and, finally, the Holocene Breydon Formation. The Breydon Formation is further divided into the intercalated layers of Lower Peat, Lower Clay, Middle Peat, Upper Clay and Upper Peat.

Figure 55. *Idealised Breydon Formation*

Entry into RockWorks

The full borehole record, down to contact with Upper Chalk or its lowest formation, for each of the collated cores was entered into RockWorks borehole manager. As the sediment of individual stratigraphic layers is often lithologically very similar, models from stratigraphic interpretations were deemed to be more informative in discussing environmental texture and process. This decision also allowed a larger percentage of the initially evaluated boreholes to be included as some records, especially from the BGS archive, only noted the stratigraphic sequence and did not included a lithological interpretation. However, in many cases, and for the entirety of the SRV and Alderton (1983) compilations, this meant that a stratigraphic sequence needed to be interpreted from the lithological descriptions. In a number of the BGS boreholes, lithology had been loosely categorised into Alluvium, Drift and Crag. Where more specific classification was possible from the associated lithology, Alluvium was divided into the Breydon Formation layers and Drift was interpreted into Lowestoft Till, Corton Beds or Kesgrave Formations. In all other cases where the stratigraphy had been interpreted in the borehole records, this was entered unaltered.

The difficulty of differentiating one stratigraphic layer from another within the boreholes was considered as a source of error in data entry. The lithological types for Terrace Gravel, Cover Sands, Corton Beds, Kesgrave and Bytham Formations and Crag can be very similar. Where the full stratigraphic sequence is represented, these units are more easily distinguished, primarily as the differences and transitions between them are then more carefully recorded in the borehole records. Where the stratigraphy was interpreted for the purposes of this study, the utmost care was taken to base this on published descriptions and on nearby borehole records with included stratigraphic interpretations based on primary observation of the sediment. Without access to additional information or the original core samples themselves, no further confirmation of the stratigraphic interpretations was possible. While every effort was taken to mitigate any error resulting from similarities in the lithostratigraphic units of the Waveney valley, it was concluded that a small margin of error would not present the problem for this study that it might elsewhere. Any anomalous misclassification of similar units would have offered interchangeable environmental textures and sensory experiences, rendering them indistinguishable by Mesolithic communities.

As the original borehole records from Alderton's (1983) collection were unavailable, it was necessary to generate location information and the sequence depths from log diagrams included in her dissertation. The full records for the five boreholes for which palaeoenvironmental analyses were completed; Stanley Carr 6, Boundary Dyke 8/2, Somerleyton Marsh 1, Fritton Decoy 1 and Caldecott Hall 2; were detailed as part of her dissertation and could be compared with the correlated log diagrams to ensure the sufficient accuracy of these figures. Each diagram displayed the boreholes taken along single cross-section and included a scale bar for the position of the cores along the cross-section and a scaled axis to depict the depth of each stratigraphic unit. The start and end points of each cross-section were noted with the scale bar. To produce the information required for the stratigraphic modelling in RockWorks, the location information was measured from the diagrams and recorded. As Alderton (1983) did not provide a stratigraphic interpretation of each borehole, the lithological information from the figures was measured and entered into RockWorks and only then reinterpreted into a stratigraphic classification. Organisation into the broader stratigraphic units allowed integration with the BGS data and served to reduce the margin of error created from measuring information from printed figures. Very little confusion between stratigraphic units was possible with the Alderton (1983) collection cores as the transition between the peats and clays recorded in this archive were comparatively sharp and distinctive.

The location data for each was additionally entered into an Excel database and ArcGIS to contribute to the spatial analysis of the boreholes and as a means of evaluating the results of the modelling process in RockWorks. Lateral differences in the distribution and density of borehole data were displayed by plotting this location data in ArcMap, highlighting potential sources of error and changes in the resolution of the stratigraphic models. A digital archive of the scans of each borehole record used from the BGS, SRV, Alderton (1983), Coles (1977) and the Wessex Seabed Prehistory project has been organised for future reference and error checking. The database of the stratigraphy entered into Rockworks has been exported and is included in Appendices A (borehole locations) and B (stratigraphic interpretation).

Modelling Process

The methodology for modelling the stratigraphic sequence of the Waveney landscape was framed in the context of the two goals set out for this chapter; evaluating the micro-scale approach to Mesolithic archaeology in the southern North Sea basin, and contributing to the interpreted record of human perception of environmental change in the early Holocene. The high-quality but varied distribution and density of borehole data offered an opportunity for the creation and assessment of three dimensional stratigraphic models in comparison with the published and grey literature descriptions of the local geology (Step 1). Building a modelled pre-Holocene land surface from the cores recording pre-Holocene sediments allowed further assessment of the shape and texture and dynamism of the early Mesolithic environment (Step 2). This modelled land surface offered not merely a background reading against which Holocene environmental change could be measured, but provided insight into the responsiveness of this landscape to the dramatic changes in ice-cover and eustatic sea-level following the collapse of the LGM, but preceding the climatic thresholds crossed with in the nascent Holocene. By plotting interpolated layers of Holocene Breydon infill, key steps in the transformation of this landscape could be determined and static images of these environments could then be graphically displayed (Step 3).

To evaluate the outputs of the modelling process, the raw location and elevation data of key sediment types recorded within the collated boreholes were then plotted in ArcMap against the modelled surface (Step 4). The xyz data for the dated boreholes was used as a well-distributed sub-section of data which could be used to look for areas of error within the river valley and to quantify any error margin. This information is vital in evaluating the confidence margin with which such geological models can be used in interpreting Mesolithic life.

For the goal of moving from static images of palaeogeography to discussing process and rate of change (Step 5), the age and depth of dated material was plotted in line graphs and compared with the published RSL curves for the region. The dated cores were plotted against the modelled pre-Holocene landscape to examine the driving force behind the formation of early Holocene sediments. These boreholes were then displayed against cross-sections across the floodplains in order to show their position within an accommodation space; the context from which the dated samples were taken.

Step 1

Upon completion of the entry of the full borehole records into RockWorks, a base map of the boreholes was created in the modelling suite to check for obvious errors in location and elevation. This base map, created from the xy-location and elevation of the top of each borehole, highlighted the need for a Digital Elevation Model (DEM) to better inform the modern topography from which the boreholes were collected. While some areas of the modelled rectangle had very high data density, the sparser data between these patches created an uneven resolution across the basemap generated from the borehole tops, meaning that this modelled layer was alone insufficient to constrain modelled isopachs of the underlying stratigraphy and that a DEM was required to more accurately reflect the topopgraphy across the micro-study area. Importantly, any errors made in the collection or entry of elevation data would have been minimized by conforming the borehole tops to the known topography.

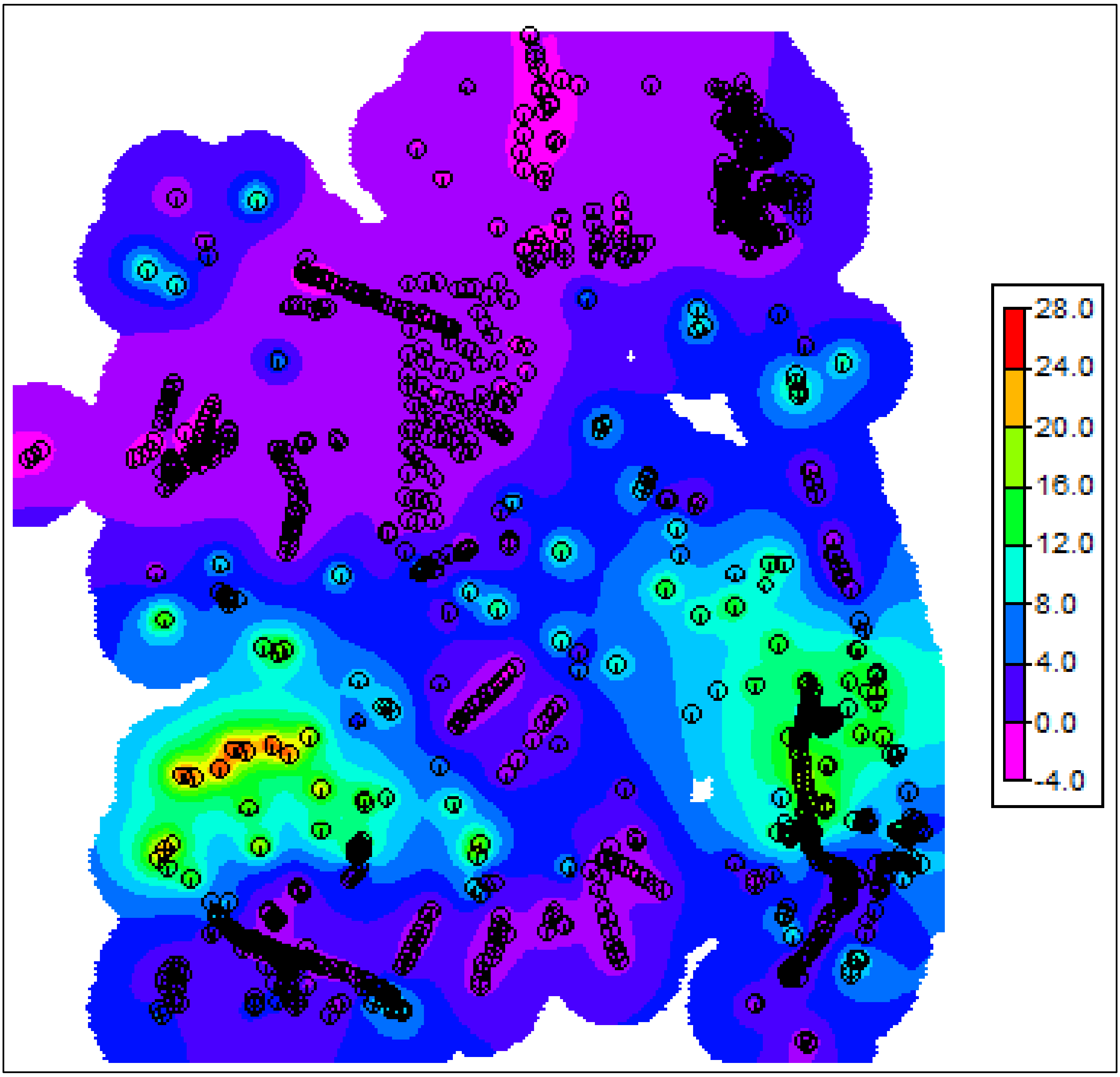


Figure 56. *Basemap generated from borehole elevations in RockWorks showing borehole locations and rough topography and demonstrating need for incorporation of DEM.*

Therefore, in order to constrain the elevation of borehole tops to the regional topography, a DEM created from Ordnance Survey Collection land-form 1:10000 tiles downloaded from Edina Digimap covering Suffolk and Norfolk. Seazone bathymetry data was re-projected from WGS84 to OSGB36 in ArcMap and was then converted from Chart Datum to Ordnance Datum elevations by subtracting 1.50m using the MapAlgebra, Raster Calculator function in ArcMap. The conversion of -1.50m was taken from the Proudman Oceanographic Laboratory difference between Chart Datum and Ordnance Datum at

Lowestoft. These datasets were then joined together using a Mosaic function in ArcMap. The resulting raster was clipped and exported at 100*100*.1m resolution for the rectangular study-area extent. As the base map and ArcGIS borehole location plots indicated several areas of higher data distribution, several additional clips of the mosaiced DEM were exported at 20*20*.1m resolution to constrain the topography of 3D models limited to these polygons.

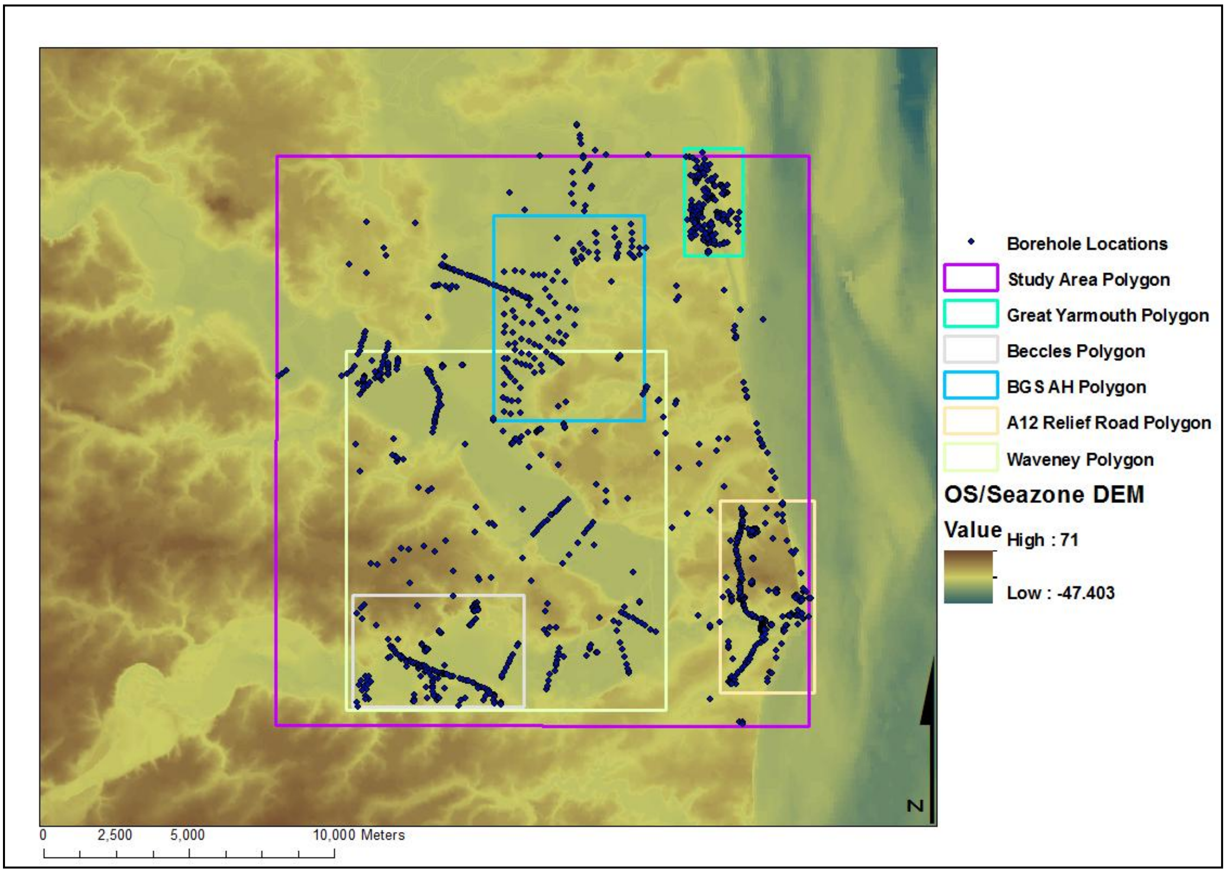


Figure 57. *Extents of modelled areas*

Selecting study area rectangles for modelling, introduces the potential for edge effects in areas of lower data density. For the larger study area, this is especially true in the north-west corner and beyond the current coastline in the east to north-east of the polygon. Also, the smaller polygons were all selected against the modern topography and based solely on the modern history of research; around the lower River Waveney the basis for Alderton's (1983) work, the cities of Great Yarmouth and Beccles, the A12 Relief Road boreholes and the BGS AH boreholes. Both the edge effects and the use of modern restrictions in selecting study areas initiate conceptual misdirection in the interpretation of modelled results. As discussed throughout this paper, an evenly high-resolution, single-surface approach is the ideal. However, the practical limitations of both the software and the reality of the data-record necessitate a methodology which cannot mitigate these ideological drawbacks. These disadvantages are transparently recognised and contextualized in the interpretation of the modelled results. While the smaller study area rectangles could have been discarded, the advantages of creating high resolution models of the complete stratigraphy outweighed the concerns. Indeed, especially along the roads projects and many river cross-sections, there was very little need for modelling as the boreholes were spaced so closely. This provides excellent comparative information between higher and lower resolution models.

Three dimensional models were created of the full study area at 100m*100m*1m resolution and of the higher resolution polygons at 20m*20m*20m resolution, matching the exported DEM using Trend Residuals, Inverse Distance Weighted (IDW) and Kriging algorithms (explained below) to display the full modelled stratigraphy of the Waveney landscape in order to compare modelling algorithms and resolutions. Elevations were constrained to the mosaiced DEM in RockWorks. These outputs allow a broad understanding of the sequencing and spatial variation in stratigraphy throughout the modelled landscape. These could then be compared against descriptions of the local stratigraphy derived from macro-scale patterns and micro-scale work with more limited data collection.

The Trend Residuals gridding method uses two steps to highlight local differences from a regional trend in a data set. Firstly, it attempts to match a polynomial trend surface, represented by a polynomial equation, to the data points. It then computes trend surface residuals by comparing the source data against the computed trend surface. These residual differences are used as localized components which are then gridded using the IDW gridding method.

In IDW, the value assigned to a grid node is a weighted average of either all of the data points or a number of directionally distributed neighbours. The value of each of the data points is weighted according to the inverse of its distance from the grid node, taken to a selected power. The greater the specified exponent, the more localized the gridding since the distant points will have less influence on the value assigned to each grid node. This method produces a smooth and continuous grid which does not exaggerate its extrapolations beyond the given data points. The range of grid values will be smaller than the data point range; constraining modelled values to within the highest data point which is applied as the maximum grid value and the lowest, applied as the minimum grid value. IDW is computationally less rigorous than alternatives which also create smooth and continuous surfaces across spatially-varied datasets. For the borehole dataset used to create this model, however, this algorithm produces a bulls-eye effect of concentric circles around data points; especially problematic in areas of lower data density.

Kriging is based on the assumptions that the value for an unknown point can be estimated from neighbouring points, but that the unknown point is necessarily completely dependent on these known neighbours. This algorithm assumes that the variability in the z-values of a data set is a function of both distance and direction. In general, therefore, points close together tend to show less variability than those far apart, and points along certain bearings will show less variability than equidistant points along a different bearing. The relationship of variability versus distance can be displayed graphically as variogram plot of variability of z values for point pairs as a function of the distance between the points. When interpolating models by Kriging, RockWorks creates observed variograms of the input dataset and finds the best fit to produce the grid model. Kriging reduces the bulls-eye effect produced by the IDW variogram and, for the dataset in use, produces the fewest modelling artefacts. However, it is computationally more demanding than IDW, which limited is usability over the full data extent.

The results from these three interpolations were compared by exporting surface elevation layers for the stratigraphic units. These were layered into ArcScene and visually compared in three dimensions. The attribute tables for Trend Residuals and IDW, Trend Residuals and Kriged, IDW and Kriged outputs were then joined and the absolute value of the difference between their elevations was calculated using the Field Calculator function. Statistics, including maximum, minimum, mean and standard deviation, were then computed from the absolute values to quantify the variation between algorithm results. After comparison between the modelled 3D results at 100m*100m*1m, the results of which are discussed below, Kriging was deemed to produce the most appropriate results for the available dataset. Therefore, therefore this algorithm was also used to interpolate higher resolution polygons around areas of higher data density around Great Yarmouth, Beccles, the BGS AH project cores, the A12 Relief Road project, and in a clipped region based around Alderton's (1983) cross-sections from the Waveney marshes. The higher and lower resolution patches were similarly compared in ArcMap both visually and by joining attribute tables and calculating the absolute value of the difference between the modelled outputs. Statistics, including maximum, minimum, mean, standard deviation and mode were then calculated to numerically determine the impact of using a higher resolution interpolation.

Triangulation and Multi-linear regression algorithms were also considered but were not used due to incompatibilities with the dataset distribution and density. Triangulation, even when constrained to a maximum distance of 5% of the modelled area from each data point, produced a result which showed no difference in lateral extent between layers from Topsoil to Crag, London Clay and Upper Chalk showed more minimal spatial coverage, however, still did not produce an informative result. While the elevation and thickness data resulting from this modelling algorithm was slightly more informative, this technique was discarded as not useful for the input dataset. Multi-linear regression was abandoned as the inconsistencies in data distribution meant that the required data point density for this algorithm was not met.

Trend Residuals, IDW and Kriged 3D models were initially created with no maximum distance constraints. A vertical exaggeration of *200 was applied to the output to pull out variations in the thickness over the lateral extent of the study area. However as the elevation of each unit's top and bottom had interpolated over the entire study rectangle, the results were not especially meaningful. The Breydon Formation, for instance, only exists in the rivers' floodplains and should not have been modelled over the surrounding high ground. Therefore, these 3D models were re-run with a 5% maximum distance constraint, smoothed and declustered. This limits the interpolation to within a radius of 5% of the modelled rectangle, reduces the effect of background noise in the model by applying a filter once, and mitigates the effect of dense patches of clustered data points in the model by creating a pre-grid which guides the model around duplicated points. The 3D models created using these settings and displayed with a vertical exaggeration of *60 began to pull out variations in the thickness and location of the key stratigraphic units.

The landscape framed by the nine offshore cores was also modelled in RockWorks at 20*20*1m resolution. However, for these cores, no maximum distance percentage constraint was applied due to the scarcity of data and the smaller modelling extent. Interpolation was done by Kriging as IDW proved to provide a visually confusing bull's eye effect. An isopach showing the thickness of Unit 4, the Holocene stratigraphic layer, was created and exported into ArcGIS for comparison against the onshore Holocene sediments.

Step 2

While the 3D models of the stratigraphic sequences do begin to show differences in the extents of each stratigraphic unit, the coverage of the Terrace Gravel shows that this layer has been interpolated still far beyond the 35 core logs within which this lithostratigraphy was recorded. As the Breydon Formation is described as being deposited directly on an amalgamation of earlier sediments, the RockWorks 3D stratigraphic modelling could not be used to represent the composition and palaeogeography of the pre-Holocene land surface. This model also failed to adequately display the compositional differences between pre-Holocene sediment located in the river valley itself and that in the surrounding higher landscape.

By exporting borehole midpoints as 3D stratigraphy shapefiles from RockWorks, however, a point file could be created in ArcGIS with an attribute table showing the x,y location and z-value for the top and bottom of each stratigraphic layer in each borehole. This output demonstrated that Holocene sediment accumulation sits variously on Terrace Gravel, Lowestoft Till, Corton Beds, Kesgrave and Bytham Sands and Gravels and Crag. Therefore, a model of the earliest Mesolithic land surface could not be created from the contact elevations with any one of these stratigraphic layers, but required interpolation across a combination of these.

Data for all Holocene material was removed, leaving information for the bottom of Lower Peat and all layers below. A pre-Holocene to Holocene contact layer could then be interpreted from these elevations. Interpolation between these contact points was carried out in ArcGIS. Kriging, Natural Neighbours and IDW algorithms were compared, but Kriging proved to interpolate the smoothest surface and this modelled output both was the best fit with the 3D Multiple Log information and compared best against the modern topography. This layer was interpolated on a 20*20m grid in OSGB36. The resulting raster was clipped along the modern coastline at the eastern edge to reduce a tiger-stripping effect caused by the sudden lack of data offshore. The final land surface was displayed as a stretched raster using an Equalized Histogram which stretches the selected colour scheme across a histogram generated from the distribution of elevation values in the interpolated model. This display is especially useful for rasters, such as this one, which have little difference between values. Histogram equalization effectively spreads out the most frequently represented values to highlight these variations. In the modelled pre-Holocene land surface, though the total range of elevations is relatively large, >50m, the differences in elevation seen within the Waveney and Yare floodplains, and on the surface of the higher landscape proves to be very small, making the histogram equalization very effective in displaying this surface.

Step 3

Isopachs were used to graphically display the modelled thickness of each layer of the Holocene infill. These were interpolated by Kriging in RockWorks over the full study area extent at a 20*20*0.1m resolution and were constrained to within a maximum distance 5% of the rectangle. The maximum distance constraint allowed for better visual interpretation of spatial trends in the location of each Breydon Formation unit. Elevation layers showing the top and bottom of each Holocene layer were also Kriged with a 5% maximum distance constraint and exported into ArcGIS to highlight north-south and coast-inland trends in the z-values of these formations.

Step 4

3D Multiple Logs were created in RockWorks, displaying the stratigraphic record and location of each borehole. This output was exported into ArcScene and, after reclassification to highlight each key unit, displayed in three dimensions. The point data for each stratigraphic layer, and for amalgamations such as the Breydon Formation or Drift Groups could then be displayed against the modelled pre-Holocene land surface and the isopachs of infilling Holocene sediments. The lateral and vertical locations and extents of these modelled surfaces could then be easily evaluated against the extant data points, thereby testing the accuracy of the interpolation across points. Equally, comparisons in the lateral coverage of different layers, especially interesting between the Lower, Middle and Upper Peat and Lower and Upper Clay, can be most easily visually analysed in ArcMap using this output. However, the size of the cores in Multiple Log output was greatly exaggerated and disproportionate to the landscape, thereby both extending data beyond its limits and creating a bulls-eye effect regardless of interpolation algorithm. An attempt to derive centroids with an attached z-value to mitigate this effect failed due to the spoked-wheel shape of the polygon exported from RockWorks. Therefore, while this is a visually striking and accessible method of evaluating the models against the initial dataset, it was used only in conjunction with the borehole midpoints exported for the creation of the pre-Holocene surface which can be displayed with smaller, more proportional dots.

In order to use these outputs to evaluate the modelled surfaces in two and three dimensions, they were exported into ArcMap (2D) and ArcScene (3D). Where the pre-Holocene land surface model, isopachs, Multiple Log and borehole midpoint outputs were layered into ArcScene, these were displayed in three dimensions using the base heights tool and the layer's own z-values. A vertical exaggeration of *100 was used to pull out variations in elevation over the full study area.

Step 5

While the above models display images of static landscapes, time-steps in the geological formation of this landscape, it is possible and important to create connections between these data points to begin to interpret process and dynamism in the environment. To discuss rate of change, a line graph comparing age versus depth of all dated material was constructed in Excel. Age versus distance from the current coastal margin was also plotted in Excel to pull out information on the age gradient increasing inland. A selection of the dated boreholes was plotted along an interpolated line derived from the modelled pre-Holocene land surface using the 3D Analyst interpolation function in ArcMap. This line followed the Waveney profile between dated cores in this river valley and highlights the position of the dated cores along the gradient of the river channel from the sea to Beccles. Multiple log sections in two dimensions were created in RockWorks for each of Alderton's (1983) five dated cross sections and for the University of East Anglia Yare cross-section developed by Coles (1977 and 1981). These cross-sections were labelled with the radiocarbon dates and error margins and used to display the position of dated samples within the accommodation spaces of the River Yare and Waveney. The Excel plots and their resulting trend lines were then compared against local RSL curves from Shennan (2002, 2006) to discuss the relationship of the indicated ground water changes with rising Holocene sea-levels in the southern North Sea.

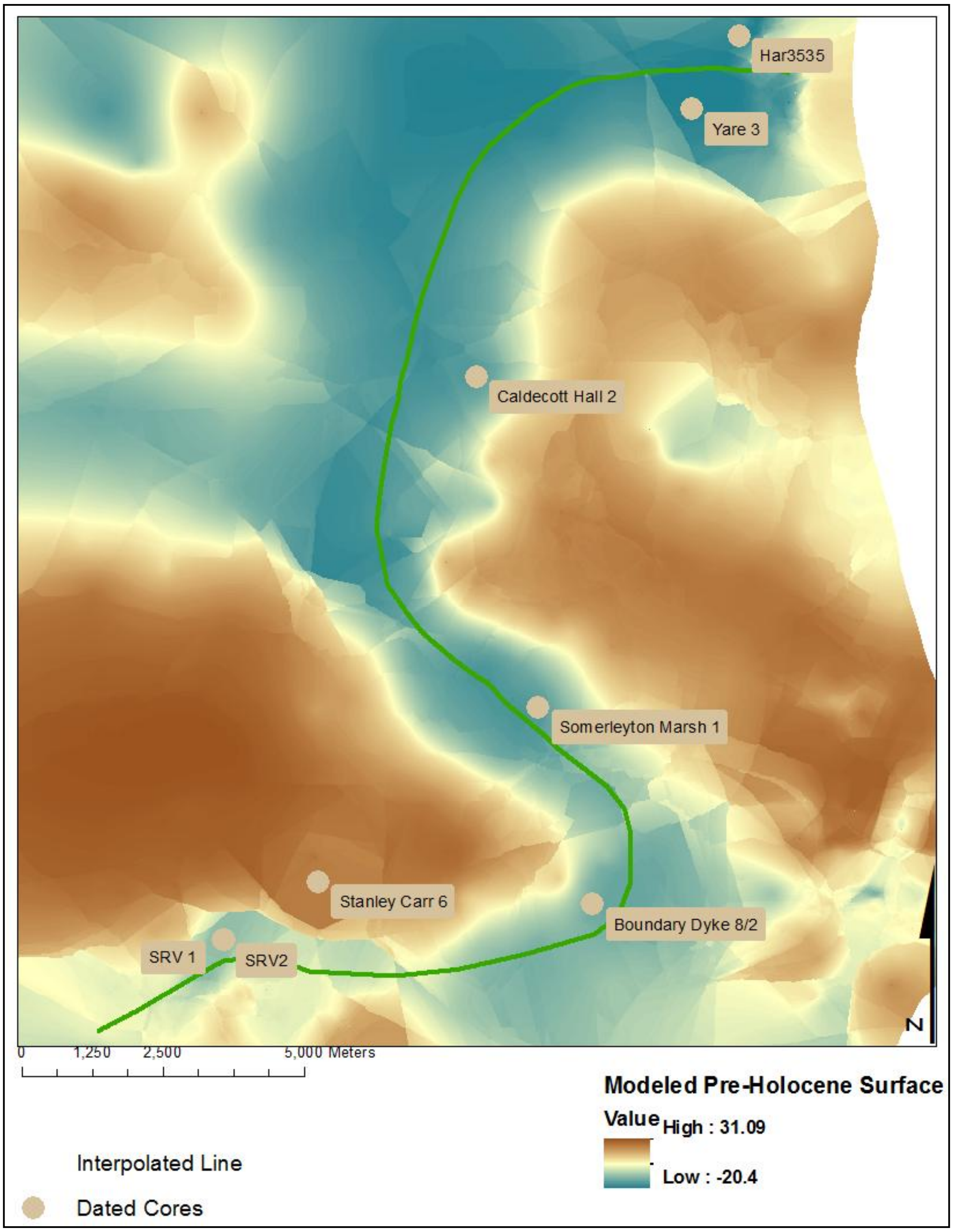


Figure 58 *Location of interpolated line passing by dated core samples in the Waveney valley plotted against the modelled pre-Holocene land surface*

Regional Sea Level Curves

Regional Sea Level (RSL) curves were taken from Shennan's (2002 and 2006) publications. Curves 40, 41 and 45 (Shennan 2002), from Norfolk, East Anglia and Essex respectively, were considered. These contained the same information as curves 41, 42 and 46 (Shennan 2006). Offshore curves 64 and 65 (Shennan 2006), from offshore North Norfolk and offshore North East Norfolk respectively, were also considered for comparison. Attempts were made to gain access to the primary data behind these RSL curves, but in lieu of this data, correlations were made against the published images. The sea level index points used to create these curves were selected from a database of 1097 points from 2212 records assembled by Shennan from 1987 to 2002 (Shennan 2002) for the purpose of building RSL curves around the coast of Britain. However, no information was available on the location of the individual index points used to create these curves. Compared to other curves created in these two projects (Shennan 2002 and 2006), relatively few index points appear to have been derived from basal peats with the majority of information generated from intercalated peats and limiting dates.

Initial Model Results

Evaluation of Step 1 (3D stratigraphic models)

The 3D stratigraphic models allow us to compare the results of the three different modelling algorithms and two resolutions applied to the Waveney valley borehole database. This is important to plainly address the uncertainty engendered by creating interpolations from even a robust dataset. Exports from the Kriged, IDW and Trend Residuals modelled sequence of the full study area and from the small, higher resolution Kriged rectangles were compared in ArcScene. Crag, Lower Clay, and Middle Peat were used as indicative layers for comparing these algorithms and resolutions; Crag as the most extensive of the pre-Holocene units, Lower Clay as the thickest sediment accumulation dating to the Mesolithic and Middle Peat as the best established Holocene peat layer. While the lateral coverage of the models was well correlated, the elevation data began to highlight the differences between interpolations and resolutions.

Algorithm Comparisons

Unit		TR v IDW	K v TR	IDW v K
Middle Peat	max	53.2 (25.5)	32.8 (25.5)	20.4 (11.0)
	min	0	0	0
	mean	3.76	3.22	1.02
	st. dev	4.4	3.7	1.61
Lower Clay	max	53.2 (25.5)	32.8 (25.5)	20.4(11.0)
	min	0	0	0
	mean	4.13	3.58	1.07
	st. dev	4.52	3.86	1.71
Crag	max	53.2 (25.5)	34.4 (26.4)	20.4 (13.4)
	min	0	0	0
	mean	4.84	4.52	1.98
	st. dev	4.64	3.77	2.03

Table 4. *Summary of the elevation differences; maximum, minimum, mean and standard deviation; measured in metres, between Trend Residuals (TR), IDW and Kriged (K) interpolations over the full study area extent. Where there was a maximum difference far in excess of the second highest difference, suggesting one extreme outlier, the second highest point was included in brackets.*

Figure 59. *Middle Peat interpolation algorithm comparisons*

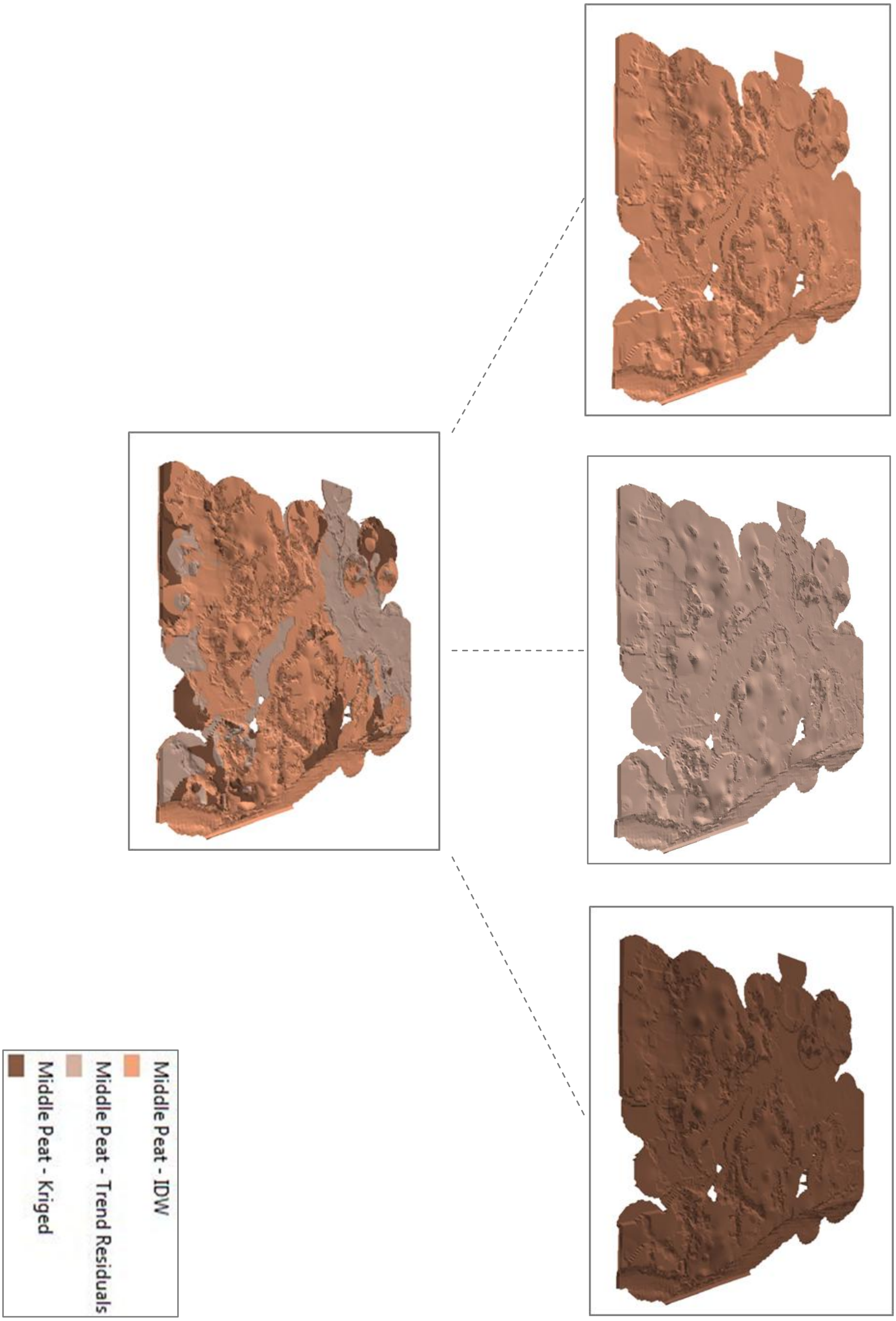


Figure 60. *Lower Clay interpolation algorithm comparisons*

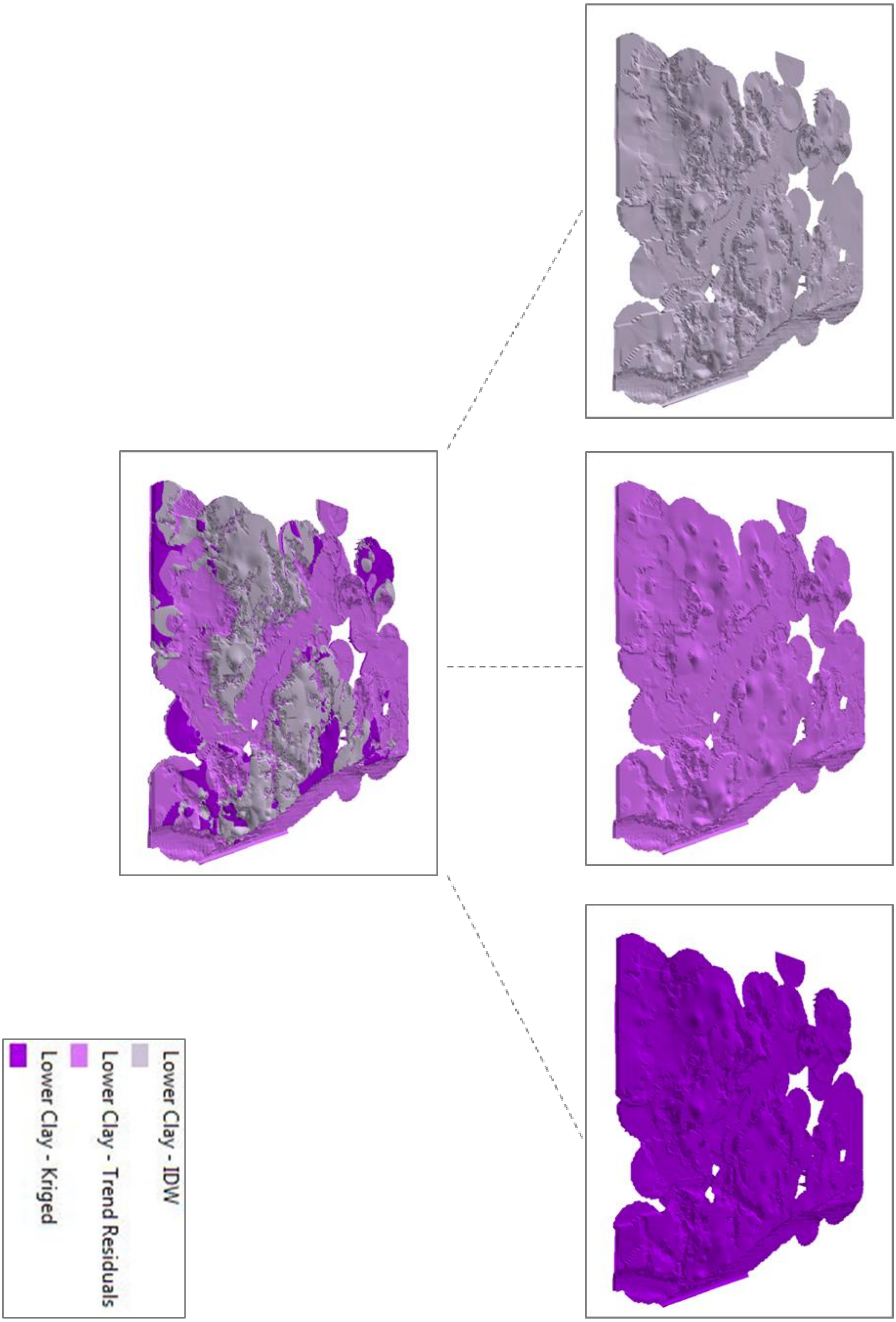
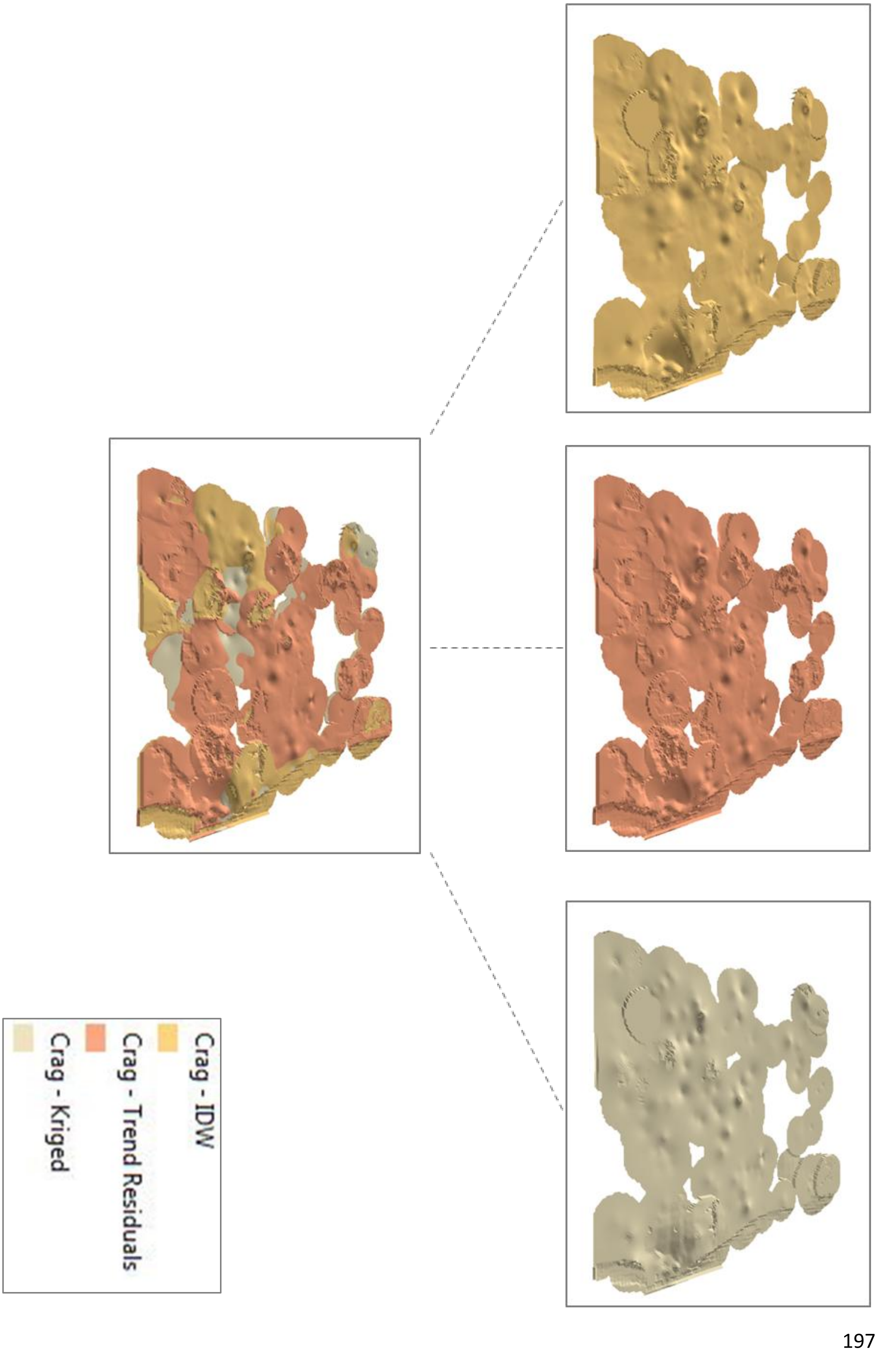


Figure 61. *Crag interpolation algorithm comparisons*

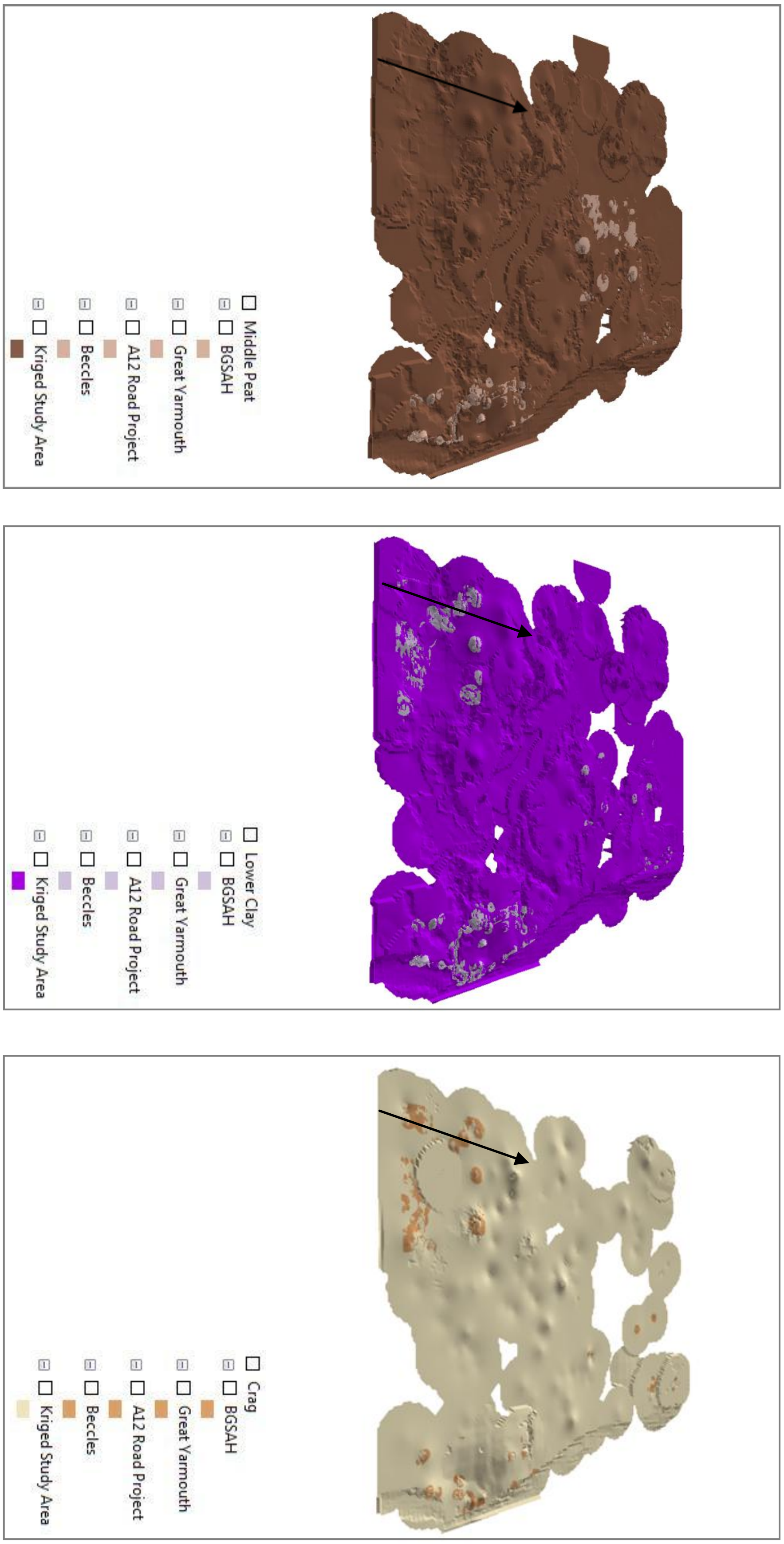


In the Middle Peat Layer, spatial trends in the elevation differences first came to the fore. In the higher land around the alluvial fan of the Waveney and Yare, the Kriged layer is sandwiched between the IDW layer, which here has the highest values, and the Trend Residuals output which is lowest in this region. In the floodplain, Kriging generally provides the highest values, with Trend Residuals showing higher results in centre of this extent. Similar results are seen using Lower Clay where IDW is again the highest outside the river valleys and Trend Residuals displaying the lowest values. However, in the alluvial fan, Trend Residuals are markedly higher than either Kriged or IDW results for the full lateral extent. In the lower Crag layer, Trend Residuals shows higher results that Kriging or IDW for most of the unit's coverage with small areas of lower results cropping up in the surrounding dry-land. As seen from the table in Table 4, in general, the correlation of elevation values between Kriging and IDW is much stronger than is seen with the Trend Residuals output. The mean differences between Trend Residuals and the two other interpolations range from 3.22m to 4.84m while the difference between Kriged and IDW results range from 1.02m to 1.98m. The Trend Residuals output provides a much flatter overall surface, averaging values to a middle value; thus, the higher river valley surface and lower dry-land. While this method's main advantage is its ability to find anomalies in a spatial pattern, it does not supply meaningful information if a regional trend is not identifiable. In the Waveney valley landscape, it appears that regional trends are not strong enough to validate this statistical algorithm. As these interpolations have all been constrained to within a maximum distance of 5% of the modelled area from the data points, the visual difference between Kriging and IDW is negligible. Equally, both algorithm options are available in both RockWorks and ArcGIS meaning that interpolations run in either package could be interpreted without accounting for different statistical methodology. In general Kriging would be preferred due to the bull's-eye effect seen with IDW which is reinforced here with the maximum distance constraint. Kriging was chosen as this effect is not due to the algorithm and can be mitigated where the maximum distance constraint is not necessary, creating the fewest data artefacts within the modelled surface.

Unit		S.A. v Beccles	S.A. v A12 Rd. Prj	S.A. v BGSAH Prj.	S.A. v G. Yarm.
Middle Peat	max	44.29	19.52	21.83	25.66
	min	0	0	0	0
	mean	2.73	3.76	4.85	2.81
	st. dev	4.46	4.81	3.26	2.89
	mode	0	0	0	4.9
Lower Clay	max	44.29	19.52	22.89	22.4
	min	0	0	0	0
	mean	3.36	3.8	4.05	5.5
	st. dev	4.7	4.82	4.07	3.6
	mode	0	0	0	0
Crag	max	37.05	18.24	12.55	21.06
	min	0	0	0	0
	mean	2.08	3.79	3.15	6.38
	st. dev	3.97	4.29	4.01	3.44
	mode	0	0	0	8.5

Table 5. *Summary of elevation differences; maximum, minimum, mean, standard deviation and mode; measured in metres, between the full Kriged study area extent interpolated at 100m*100m*1m and the smaller Kriged polygons interpolated at 20m*20m*0.1m.*

Figure 62. *Comparisons of interpolations at different scales using the selected study polygons*



Smaller rectangles run at a higher resolution, 20m*20m*1m were, therefore, created using Kriging and compared against the larger, lower resolution full study area Kriged interpolation. Each of the units used for comparison, again Crag, Lower Clay and Middle Peat, shows a generally lower surface elevation in the higher-resolution exports than in the 100*100m model specifically for sediment in the floodplain of the rivers Waveney and Yare. In Middle Peat, the agreement between scales was relatively high, with the worst comparison showing in the Great Yarmouth polygon. As seen from Table 5, the mean difference at Great Yarmouth was lower than in the Road Project or BGSAH polygons, but the mode in each of the other polygons was dominantly 0m, whereas that at Great Yarmouth was 4.9m with secondary modes of 4.5m and 0m, indicating that this is the worst fit of the Middle Peat interpolations. The frequency distributions graphically display the difference in fit between sites (Figure 63) and also illustrate the source of the higher mean difference seen in the BGSAH polygon which exhibits a secondary mode near the 4.85m mean. At Beccles, in the alluvial fan of the Waveney, Middle Peat elevation correlation between the two scales was better inland and fell off further downstream despite the high density of cores containing middle peat and requiring very little interpolation between them. Similar patches of dissimilarity are seen in the A12 Road Project cores despite high data density. These results are echoed in the Lower Clay record, though this layer highlights the good agreement between scales around the BGSAH project which offers a lower data density. Great Yarmouth, despite a 0m mode, can again be seen to have the worst correlations between high and low resolution interpolations through both a visual interpretation of the 3D export (Figure 62) and through the frequency distribution graph of differences (Figure 64). Crag, with a lower overall data density shows a fairly high correlation between scales, except at Great Yarmouth which displays the highest average mean and mode differences (Table 5). The other polygons show similar frequency distribution curves and generally lower mean differences than in other layers (Table 5 and Figure 65).

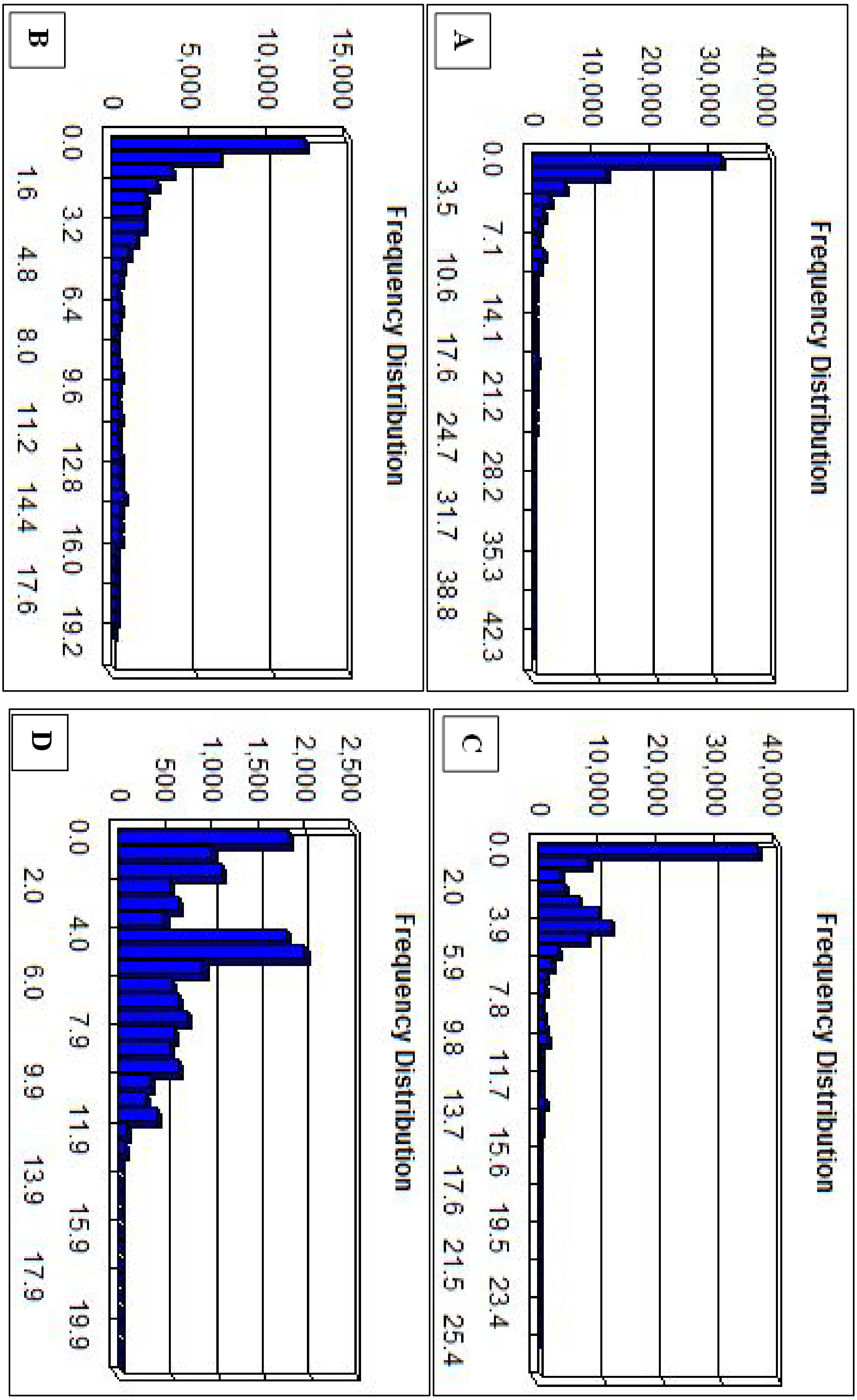


Figure 63. *Frequency distribution graphs for difference between Middle Peat interpolations: a. Beccles, b. A12 Road Project, c. BGS AH, d. Great Yarmouth*

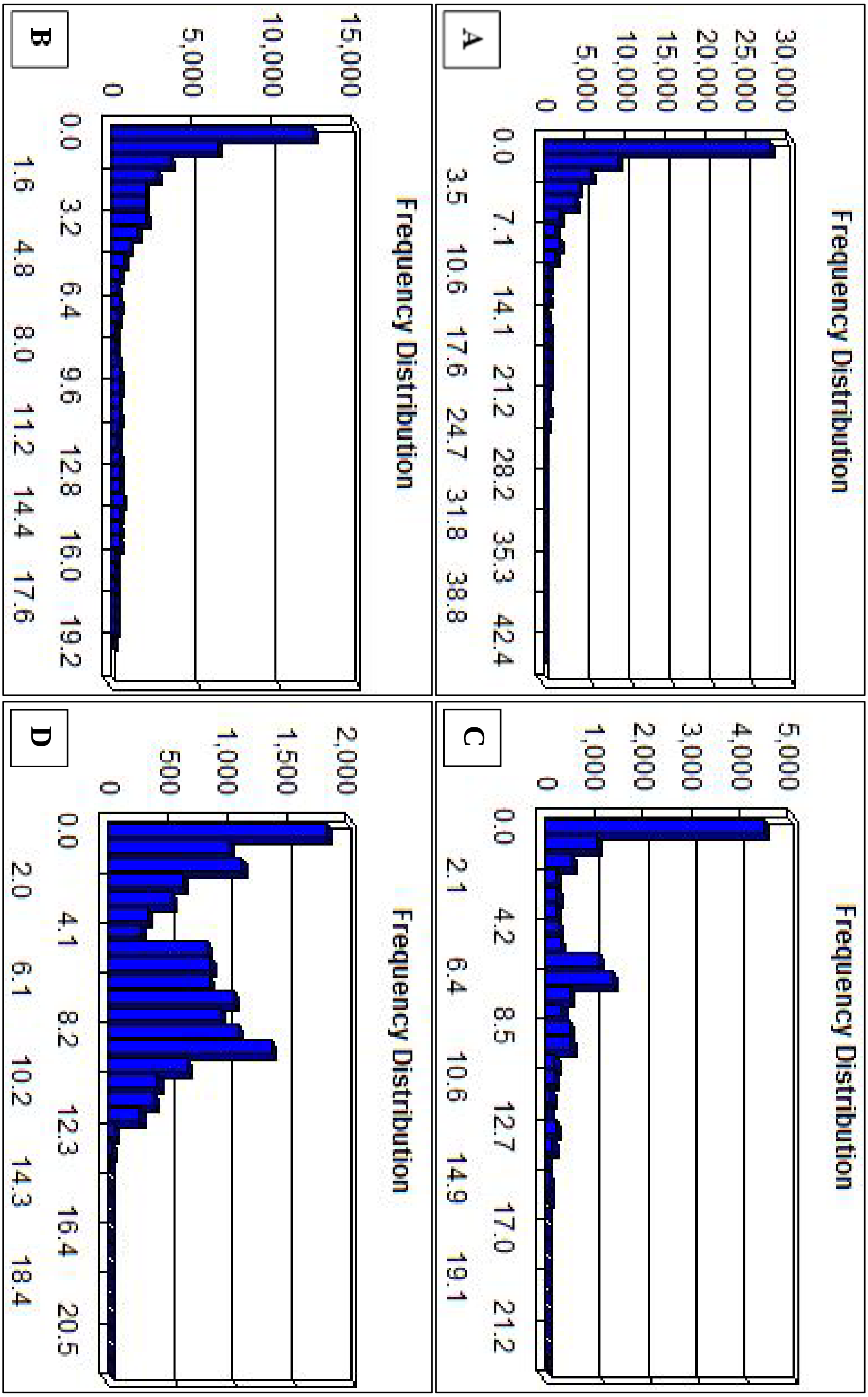


Figure 64. *Frequency Distribution graphs for difference between Lower Clay interpolations: a. Beccles, b. A12 Road Project, c. BGS AH, d. Great Yarmouth*

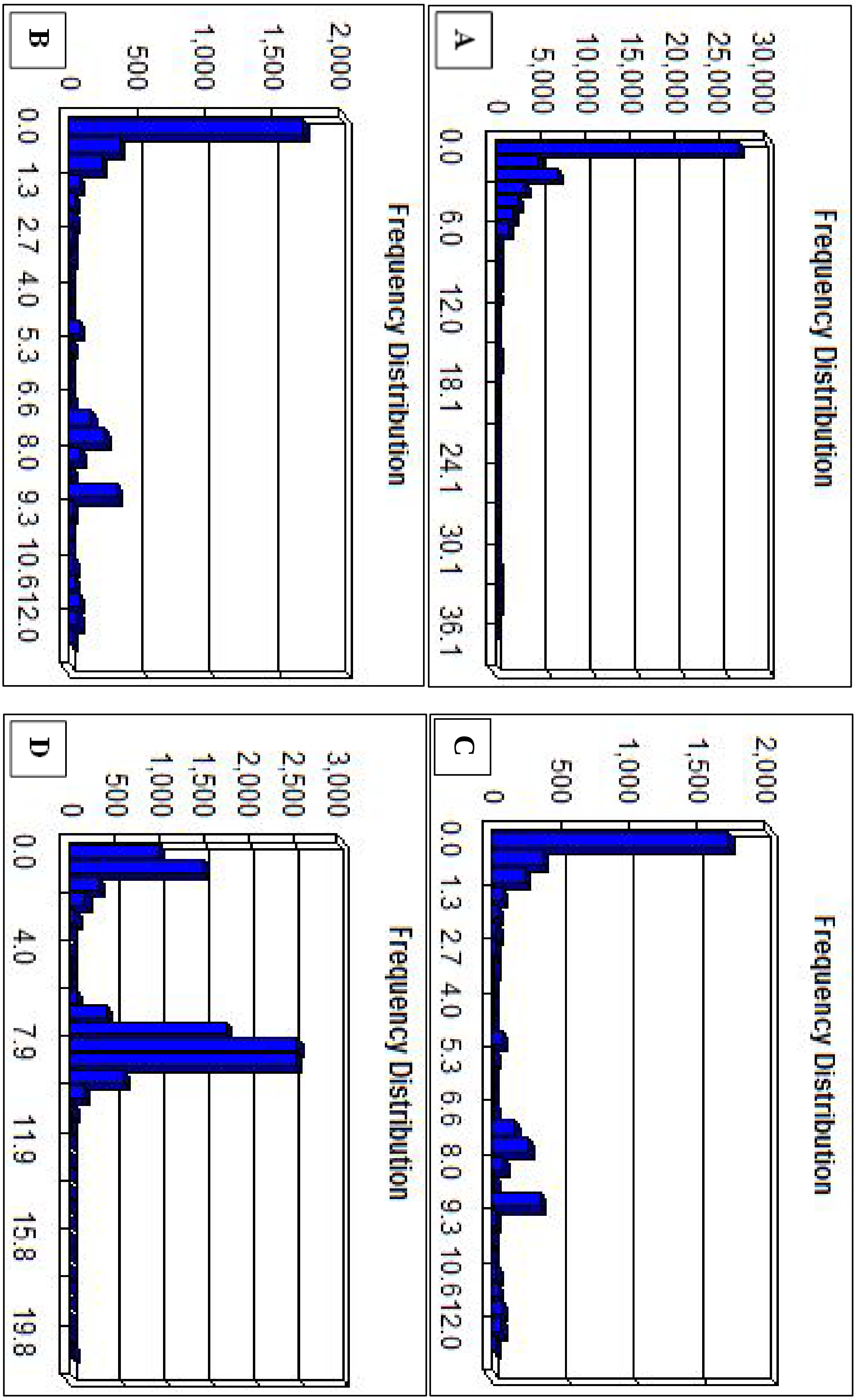


Figure 65. *Frequency Distribution Graphs for difference between Crag interpolations a. Beccles, b. A12 Road Project, c. BGS AH, d. Great Yarmouth*

In summary, it can be seen that using the larger 100m*100m grid trends higher than the modelled 20m*20m*0.1m interpolations. The worst correlations are seen in the Great Yarmouth polygon, despite a robust data distribution and density. This indicates a core-to-core variation of unit elevations seen in this stretch of the Waveney and Yare valleys and highlights the need for a high resolution approach to the local variation in this area. The strongest correlations are seen further upstream in the A12 Road Project and Beccles polygons where core samples were often taken along a line with a very high data density leaving little room for interpolation between data points. While the BGSAH polygon, with fewer data points, showed greater variation between interpolations, the highly dominant mode difference was 0m for each modelled unit.

The final Kriged outputs frame the contours of the stratigraphic sequence of the Waveney Valley. Importantly, these 3D models best display the shape of the underlying Upper Chalk unit which moulds the elevations and thicknesses of later sediment accumulations. The dramatic west to east decline of Upper Chalk's surface elevation creates the space for the dramatic seawards thickening of the Holocene Lower and Upper Clay units. Without the sharp coastal slope of the upper surface the bedrock Upper Chalk stratigraphic layer, the palaeogeography of the Waveney landscape would have been more resistant to the effects of the Holocene rise in North Sea waters. With this slope, the early Holocene geography created conditions in which sea-level rise driven alluviations could form in the Waveney and Yare valleys, capturing a record of Holocene oscillations in ground-water level and marine influence. The proxy data trapped in this record allows us to thereby model the conditions and texture of the Mesolithic environment. The inland-rise in elevation of Upper Chalk causes more resilience of the landscape near Beccles to early Holocene sea-level rise, and a thinning of Breydon Formation sediment accumulation, allowing investigation into the influence of micro-scale geology on the local expression of macro-scale environmental patterns. This geology mitigates the impact of the oscillating North Sea rise, and records the effect of this alleviation on the environmental proxies. Therefore, the 3D models of the Waveney landscape show the robust suitability of this micro-scale location for palaeoenvironmental research in contrast with micro-landscapes such as that at Romney Marsh.

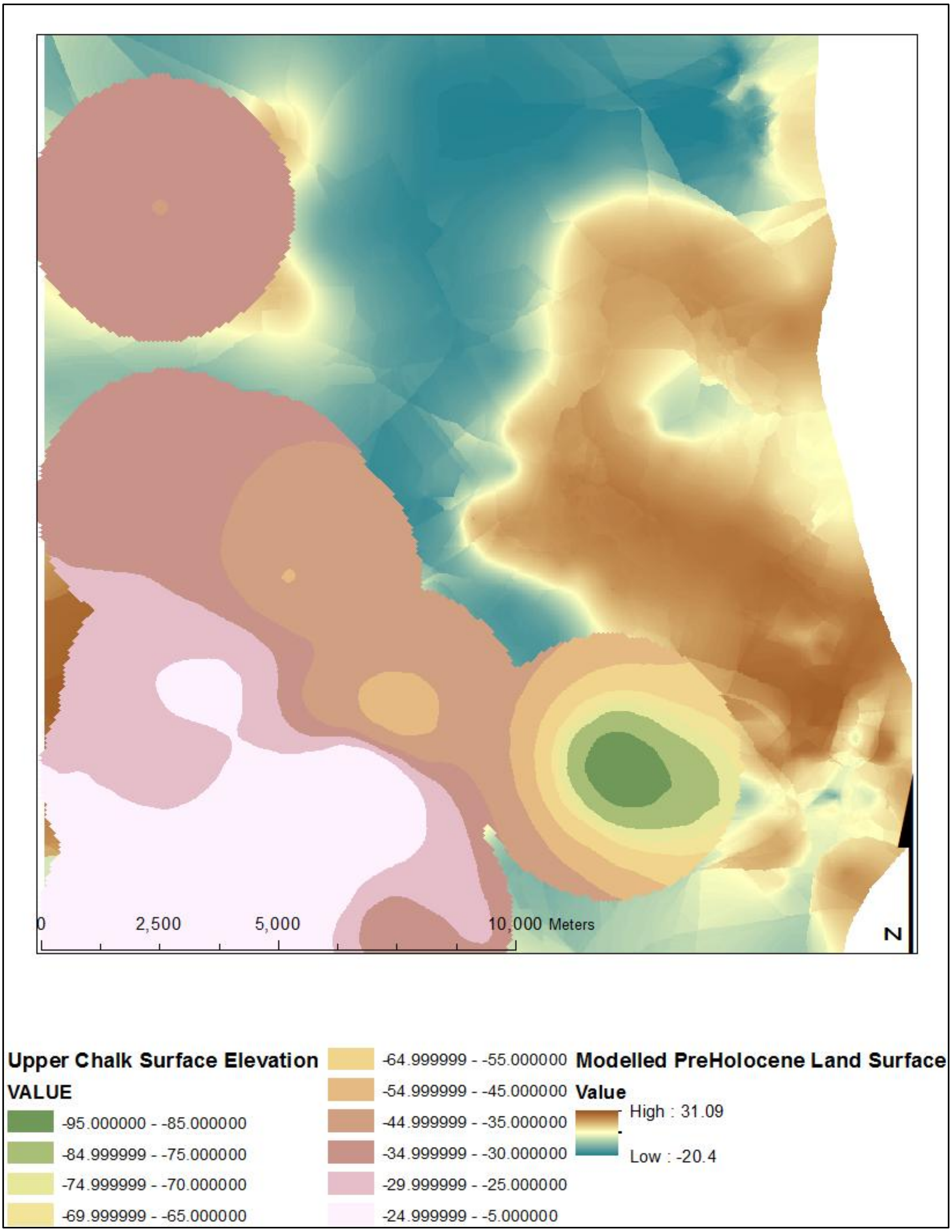


Figure 66. *Upper Chalk Surface elevation declining sea-wards*

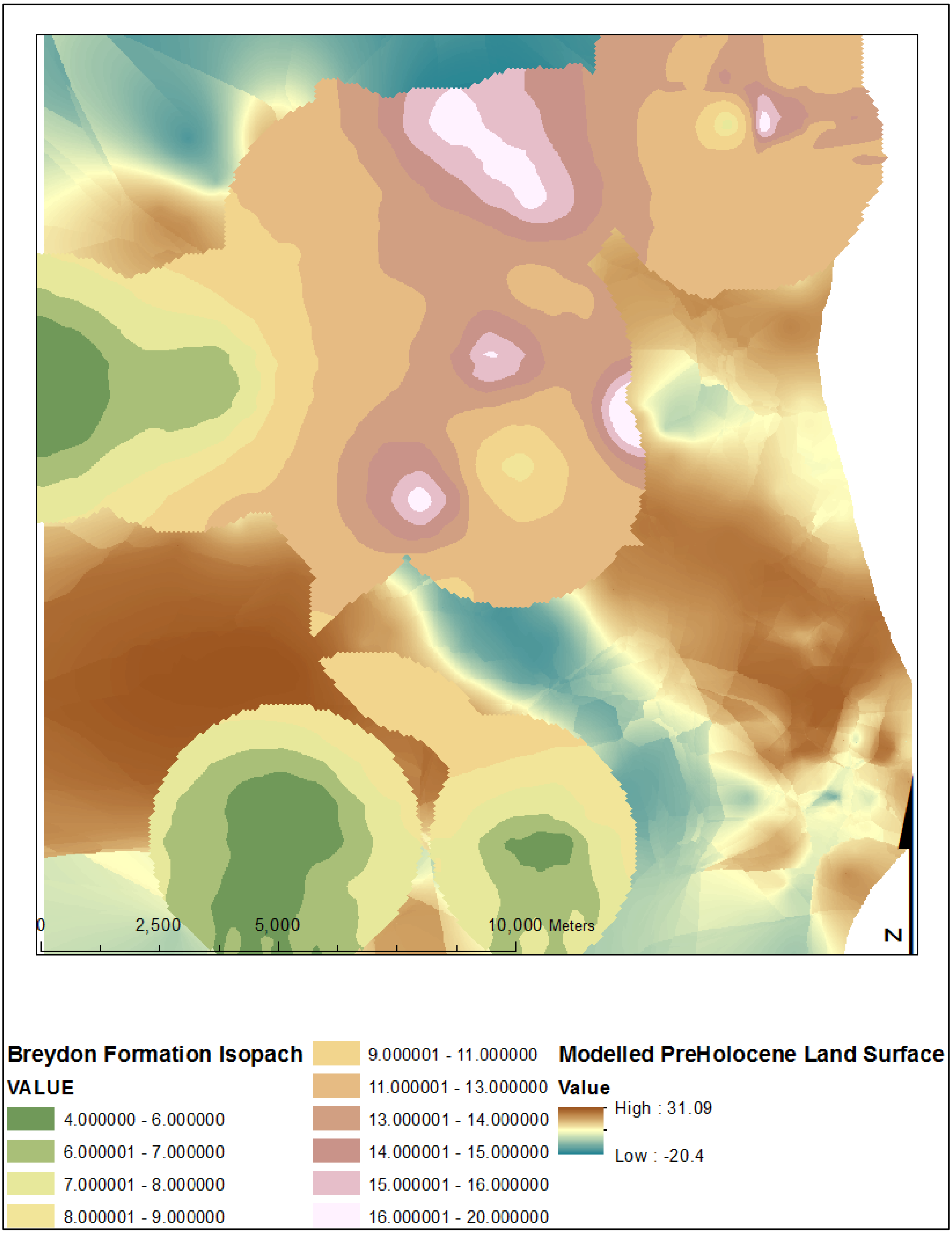


Figure 67. *Isopach of Breydon formation showing thickness increasing sea-wards*

An equally important implication of the slope of Upper Chalk is that, while this unit is entirely buried near to the modern coastline, the steep rise leads to its surface exposure below Holocene accumulations for several cores inland. This exposure comprises an inland-trending change in the texture of land surface experienced by Mesolithic communities. However, the exposure of these sediments and other pre-Devensian units which are variously part of the surface amalgamation in the nascent Holocene cannot be seen in the 3D models. This level of detail is only exposed by the Multilog 3D outputs and the borehole midpoints, demonstrating the fallibility of using a single modelling output for interpretation of a complex landscape.

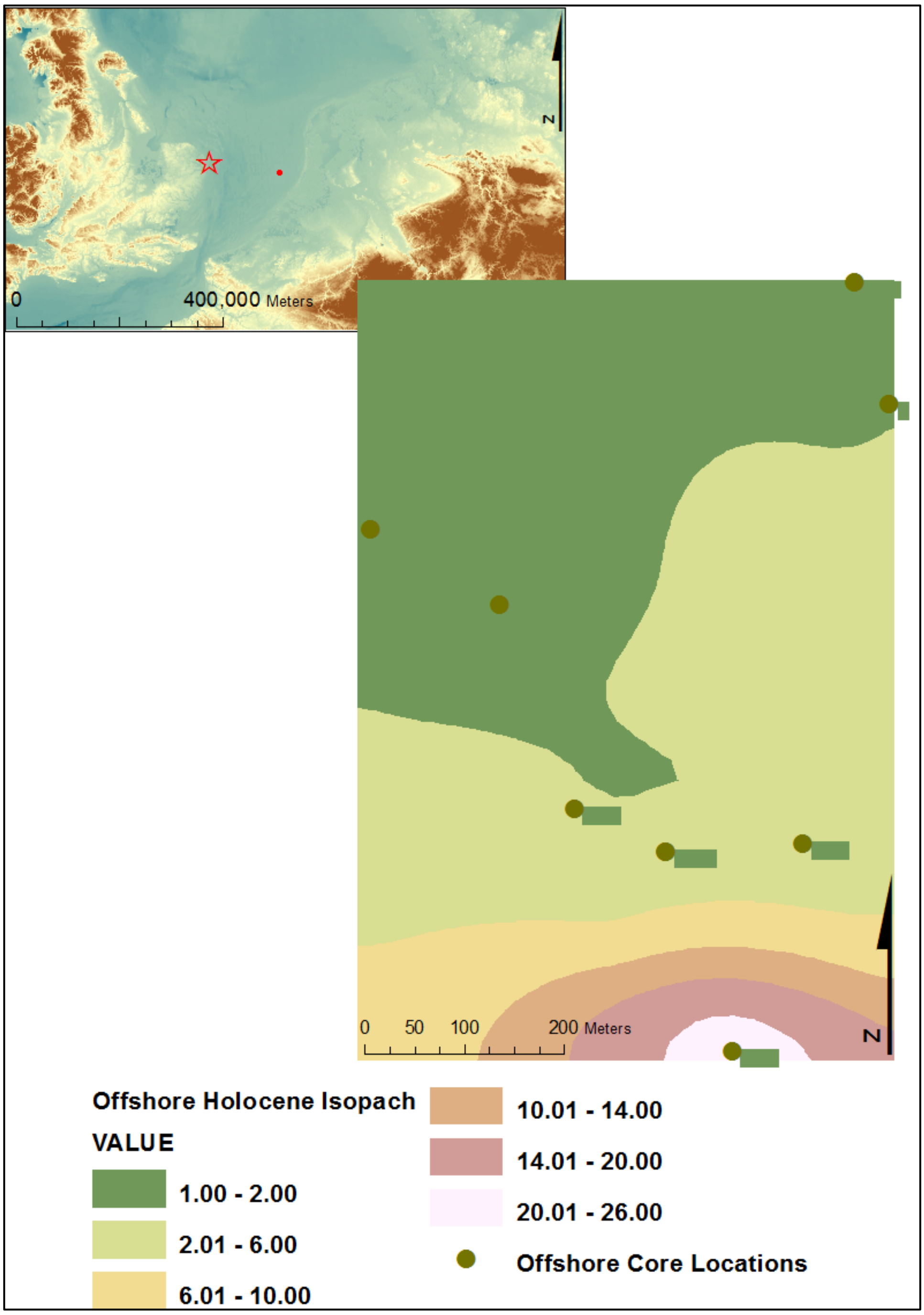


Figure 68. *Isopach generated from offshore Wessex Seabed Prehistory cores*

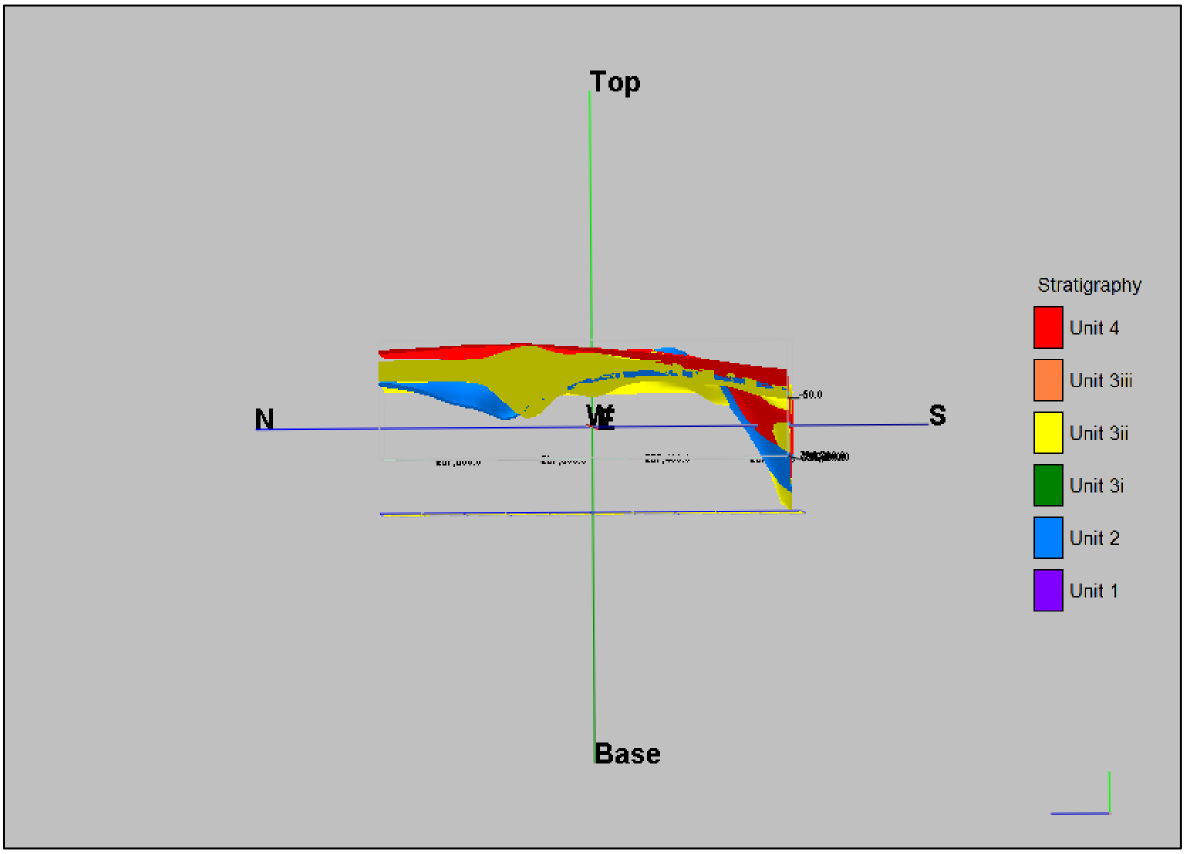


Figure 69. *3D model of offshore cores exported with a vertical exaggeration of *10*

The modelled 3D stratigraphic sequence from the Wessex Seabed Prehistory offshore cores is markedly different from that developed from onshore cores. Focusing on the Holocene stratigraphy, this stratigraphic layer is composed of sands and gravels rather than the intercalated peats and clays sequence seen in the cores from the Waveney landscape. A comparison of the thickness of the offshore Holocene stratigraphy with that in the Waveney landscape is difficult to achieve due to the strong gradient seen from north to south in the offshore cores. This sharp increase from an average of 4m thick to 26m is coupled with an equally dramatic bathymetric drop which is difficult to interpret without further contextual information. Taking a mode thickness of >4m, this is substantially thinner than the Holocene infill in the Waveney valley. Without the ability to collect further information, this can be interpreted as the result of the erosive higher energy environment in the currently submerged southern North Sea as well as a product of the local geography reducing the opportunity for a high rate of Holocene sediment accumulation and preservation. If so, this has strong implications for the perpetuation of near shore early Holocene landscapes in the southern North Sea. While the evidence from Regions VI and VII as discussed in Chapter 4, demonstrates the existence of critical new information to be garnered from the submerged extent of the macro-basin, the high-energy environment of much of this region will have eroded this dataset, thereby further complicating the analysis of palaeosoils and interpretation of the distribution of archaeology from this area.

Evaluation of Step 2 (Creation pre-Holocene land surface)

Following the lesson from the artificially heightened regions displayed between the 100m*100m*1m and 20m*20m*0.1m Kriged interpolations compared above, the pre-Holocene land surface was first of all exported into ArcScene and compared against the radio-carbon dated boreholes from the lowest lying land on the banks of the River Waveney. Despite having used Kriging and a 20*20*0.1m resolution to interpolate across the data points used to create this surface, it can be seen that the Waveney alluvial fan is artificially high by ~2m. This is due to the local geography and patterns in the varying borehole depths. The majority of boreholes collected from the wetland area of the Waveney valley only recorded Holocene sediment, ending at contact with Lower Peat or Lower Clay. Indeed, many of the shallowest boreholes recorded only the top of the Breydon Formation. Information on the underlying sediments, therefore, is much more limited in the Waveney floodplain. As the surrounding local topography is substantially higher than the elevation of the wetland, the lack of data leads to a false increase in these elevations. The sharp slope formed at the dry-to-wetland edge in the modern DEM consequently cannot be reflected in the modelled land surface. The steepness of this transition can be seen in the white line created in the slope analysis of the modern DEM, and is not seen at all in the modelled land surface.

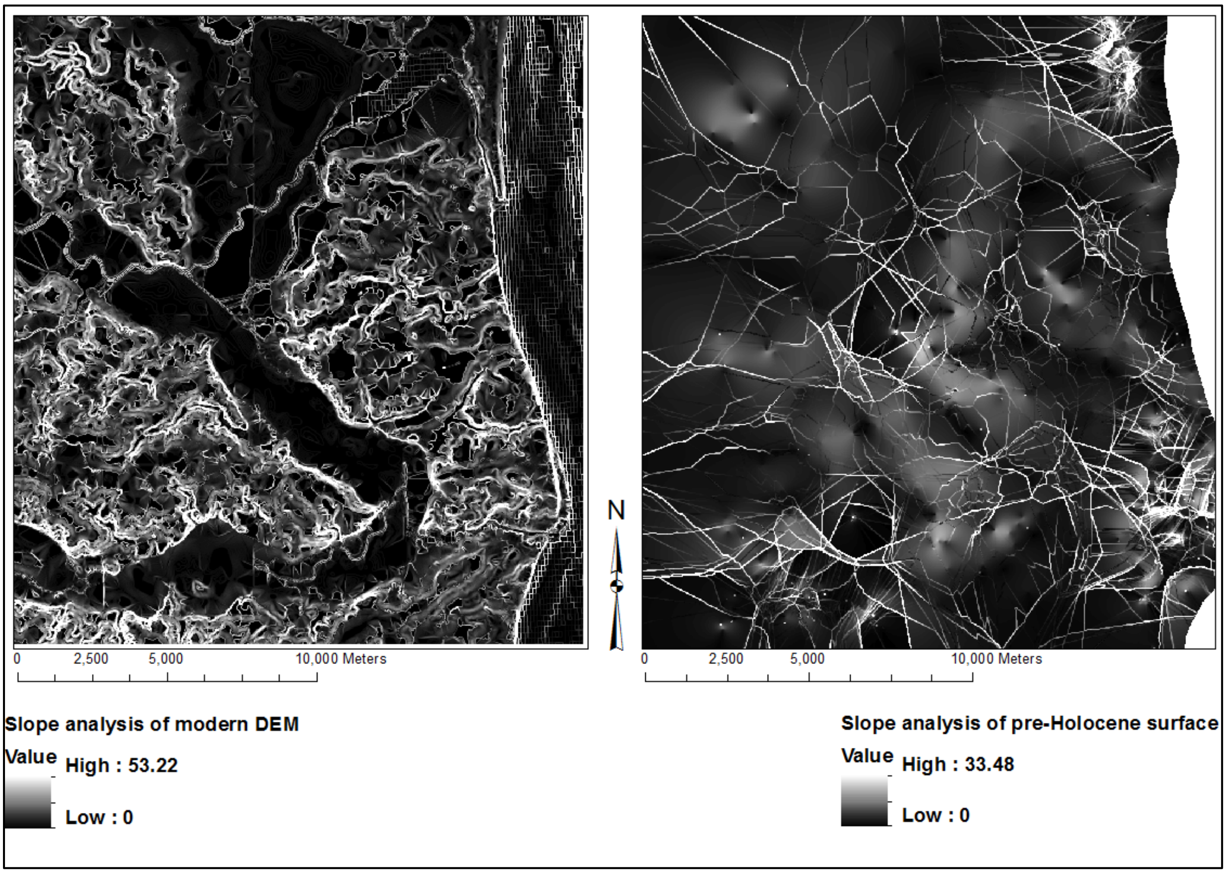


Figure70. *Slope analysis of modern DEM compared with that of the modelled surface*

This data artefact is most substantial near the dated sediments at Alderton's (1983) Caldecott Hall 2 borehole. In this section, the error margin between individual boreholes and the modelled land surface is seen to be most substantial. This is due to the parity of data points recording pre-Holocene stratigraphy. This is especially problematic in this transitional stretch of the Waveney where the negative slope of the river valley is increasing towards the North Sea mouth. The data density at the river mouth may, in fact, compound the problem around the Caldecott Hall cores as it can be hypothesized that the valley slope would begin to shallow here, artificially raising the middle of the slope created by connecting data at the inland and coastal reaches of the Waveney valley. The artificial elevation in the modelled Waveney floodplain can then be confidently attributed to the limitations of the dataset and is not an error of the modelling methodology. Understanding the source of this error allows it to be accounted for in interpretation.

Without using modern topography and models derived from fewer boreholes than those used in this study to artificially constrain the model and lower the elevation of the Waveney wetland, the impact of this data artefact cannot be significantly diminished. One attempt was made to include data on the bottom of Lower Clay into the kriged interpolation; Lower Peat being too sparse to significantly lower the Waveney wetland; but this had little impact on the overall modelled depth and was discarded. The raster interpolated from preHolocene material and Lower Peat bottom was judged to be the most useful model.

Evaluation Step 3and 4 (Models of Holocene Infill)

The isopachs of each Breydon Formation unit allowed comparison of the modelled landscape with the described and predicted extents of Coles (1977) and Alderton (1983). In the upper Yare valley, Coles describes an unbroken sequence of deposits, whereas in the lower valley, he sees an erosion of Lower and Middle Peat. Alderton (1983) describes two sequences, depending on location in the Waveney valley. At Stanley Carr in the upper valley, she describes the upper Breydon sequence of her equivalents to Middle Peat, Upper Clay and Upper Peat, where as she describes the lower part of the Breydon sequence further downstream at Boundary Dyke with the presence of Lower Peat, Lower Clay, Middle Peat and Upper Clay. While the spatial trends noted in Alderton's (1983) dissertation are borne out by the modelling work done in this project, with further data integration it can be seen that these were not as widely applicable as indicated by the net of 120 boreholes she collected. Even with her extensive pattern of 17 cross sections, the additional cores applied by this dissertation, it can be seen that the full Breydon sequence continues further upstream in the Waveney valley despite significant thinning and increased impersistence of Lower Peat and Lower Clay. Similarly, Upper Peat can be seen to thin and become less prevalent downstream from Boundary Dyke, but is present in the wider network of boreholes collected for this study. Cole's (1977) interpretation of erosion of Lower and Middle Peat is substantiated in the diminishing of these isopachs towards the North Sea mouth.

Evaluation Step 5(Date Plots and comparison with RSL Curves)

While each of the above modelled outputs displays a visualization of only static environments, we can plot the age of sediments against their depths to explore temporal trends in the deposition of these layers. These age-depth line graphs are not meant to simulate the change in regional sea-level for East Anglia in order to reconstruct standing RSL curves, but do explore the relationship between the rising North Sea waters and the ground-water and sediment regime changes on this landscape scale.

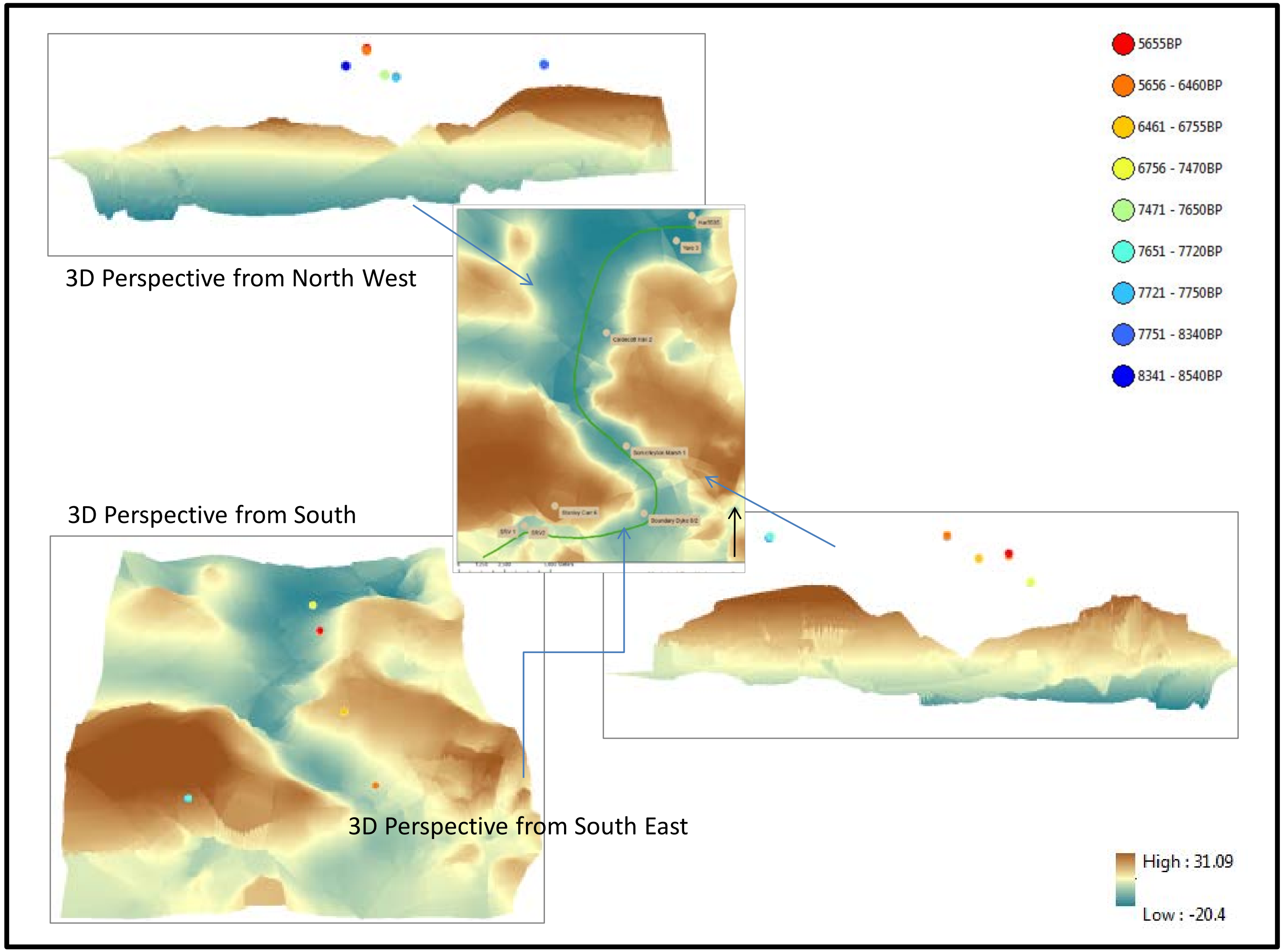


Figure 71. *Views of the location of dated Lower Peat material displayed against the modelled pre-Holocene surface which has been artificially lowered by 50m in order to improve visibility of dated material. The full scene has been vertically exaggerated by a factor of 100, to facilitate the visual distinction of varying peat heights. Peat dates have been displayed in a colour spectrum to display patterning in the formation of this layer.*

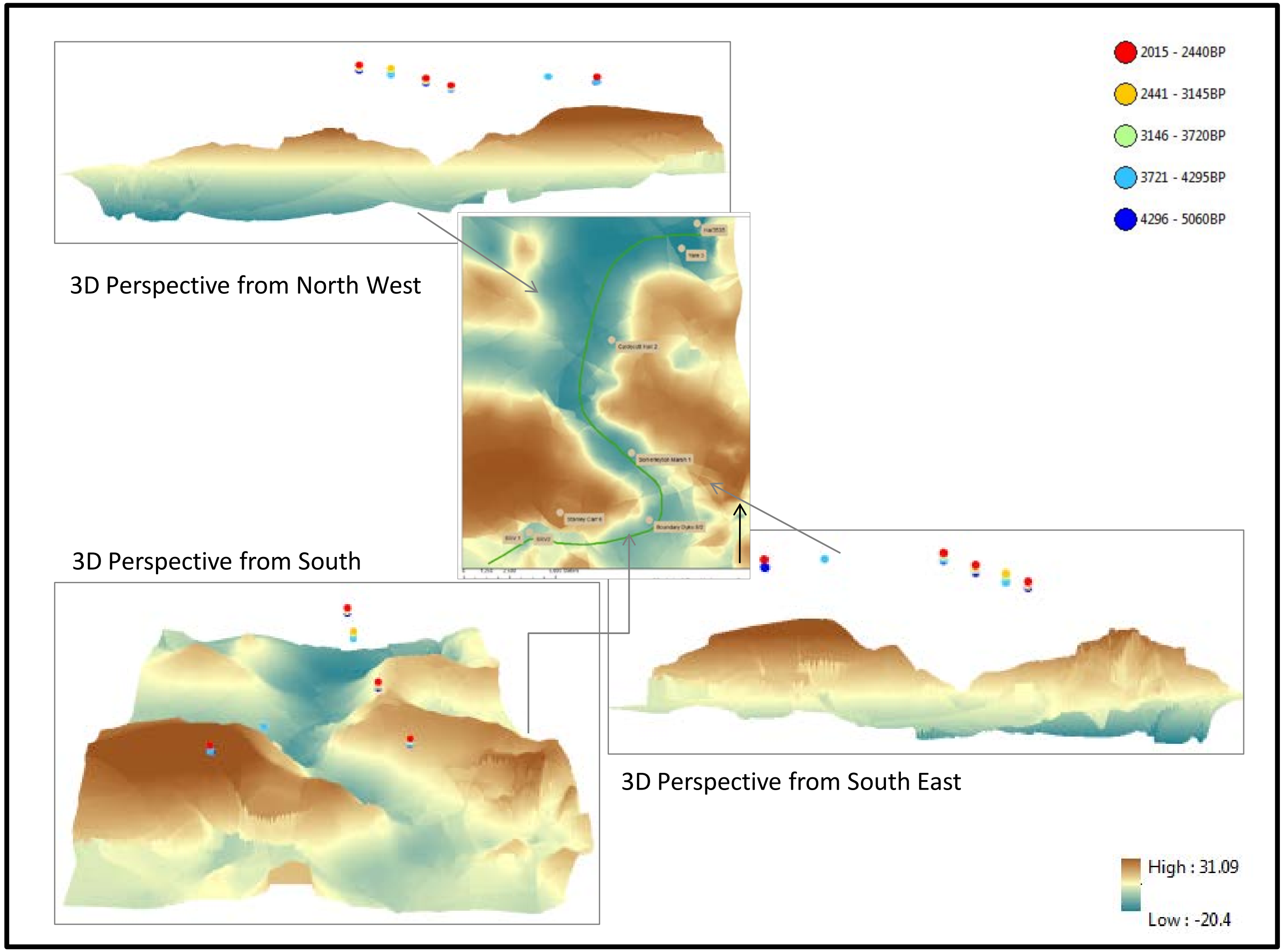


Figure 72. *Views of the location of dated Middle Peat material displayed against the modelled pre-Holocene surface which has been artificially lowered by 50m in order to improve visibility of dated material. The full scene has been vertically exaggerated by a factor of 100, to facilitate the visual distinction of varying peat heights. Peat dates have been displayed in a colour spectrum to display patterning in the formation of this layer.*

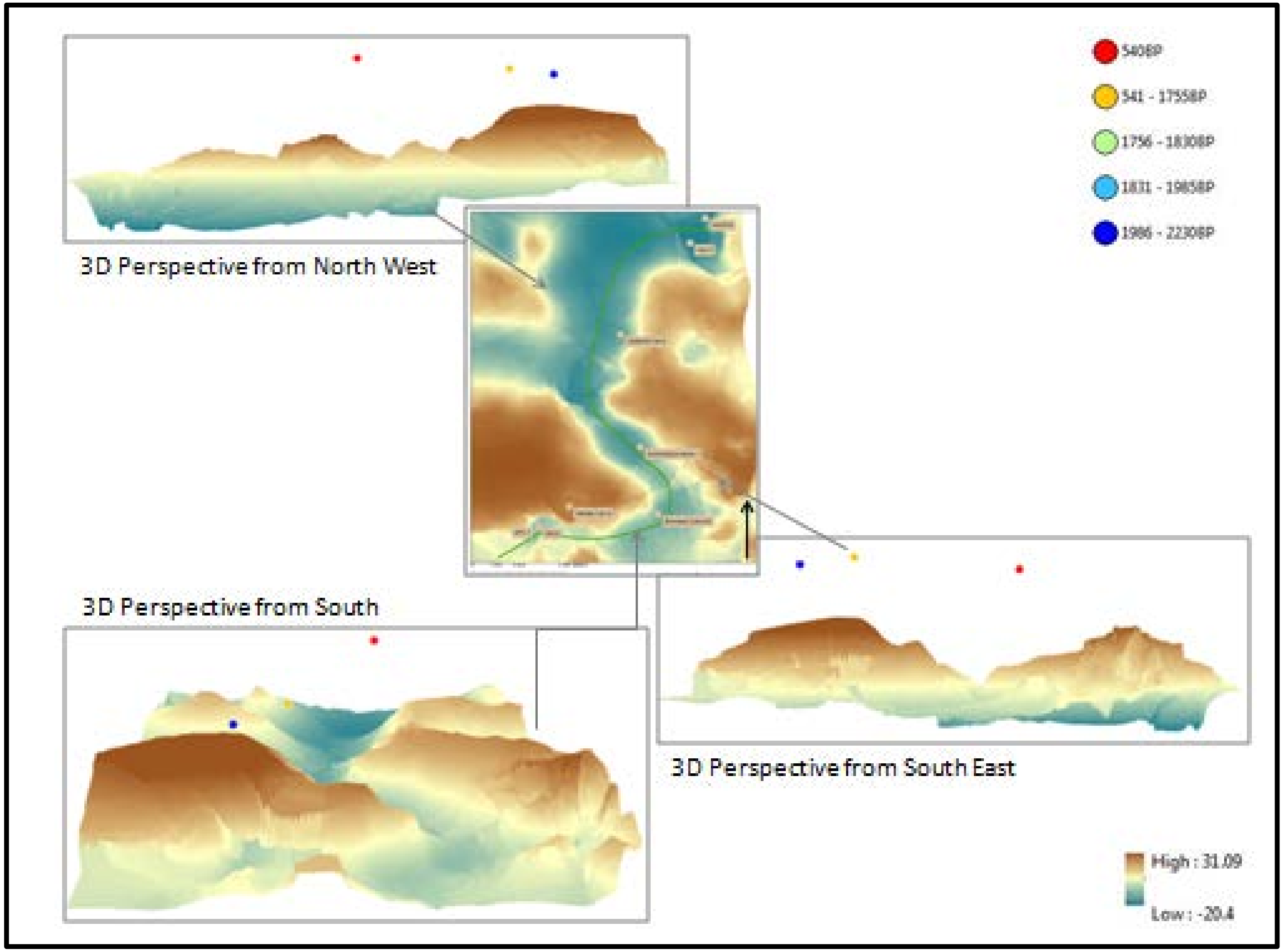


Figure 73. *Views of the location of dated Upper Peat material displayed against the modelled pre-Holocene surface which has been artificially lowered by 50m in order to improve visibility of dated material. The full scene has been vertically exaggerated by a factor of 100, to facilitate the visual distinction of varying peat heights. Peat dates have been displayed in a colour spectrum to display patterning in the formation of this layer.*

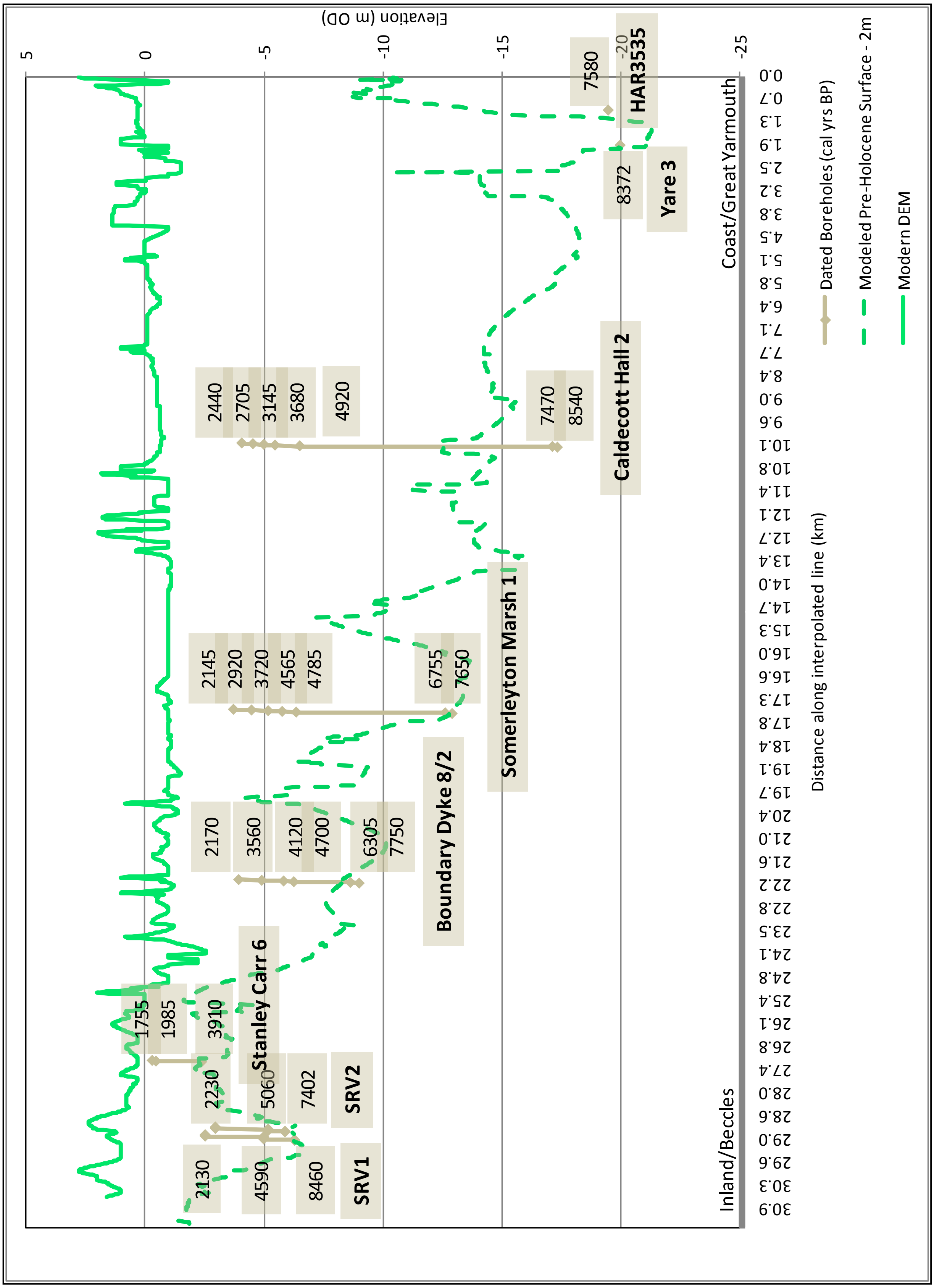


Figure 74. *Line-graph of interpolated lines along the modelled pre-Holocene surface and the modern OS/Seazone DEM, and boreholes with dated samples located along this line. Dated samples from Alderton (1983); 14C dates BP derived from organic material.*

Graphs formulating data in the manner of Figures 71, 72 and 73, presenting the dated cores collected by Alderton (1983) in the Waveney valley, led her to the conclusion that peat formation in the Waveney was due primarily due to local geography leading to back-bay ponding and was not driven by sea-level oscillations in the forming North Sea. This is due to the apparently simultaneous formation of peat throughout the Waveney valley with similar earliest peat dates shown at both Great Yarmouth and at Beccles for both Middle and Lower Peat. However, this interpretation ignores the fact that the inland peat samples were taken from basal peats and Alderton's coastal boreholes were not bottomed out in contact with pre-Holocene sediment, meaning that the earliest coastal peats were not sampled in her project. Neither do these formulations of the data present the age and depth of dated samples against each other in a means to promote comparison with local sea-level curves.

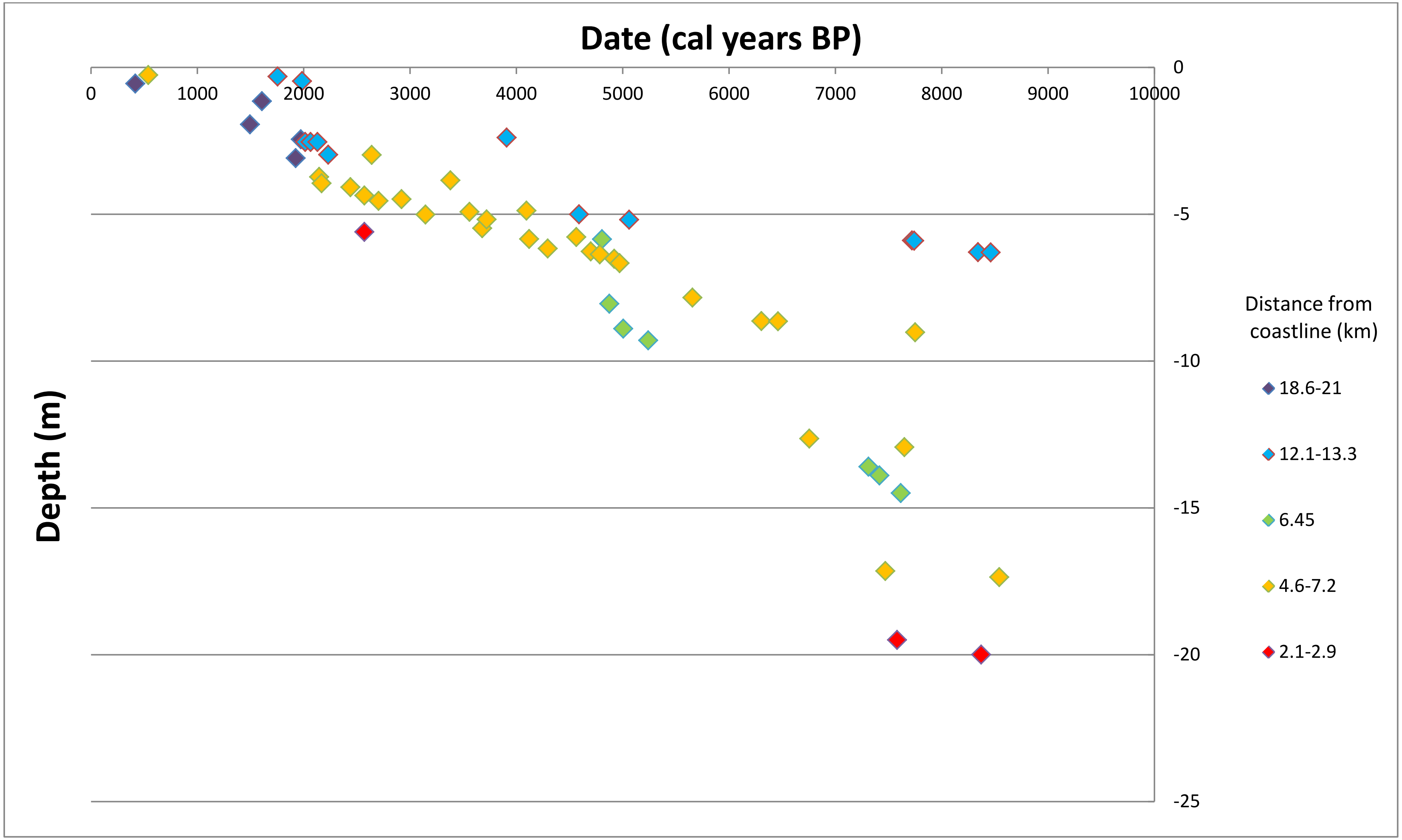


Figure 75. *Age-depth graph of all dated core samples*

By plotting the age of the wider range of cores collected in this study against the depth at which they were collected and grouping these samples by distance from the coast, a strong pattern of early, deep peat formation at the coast with later, shallower peat formation inland can be seen. This curve also has a strong visual correlation with Shennan's RSL curves, Figure 76, from on and offshore locations around the study area. This correlation suggests the greater role of North Sea sea-level rise in the changing landscape of the Waveney valley than that accounted for by Alderton. The influence of the rising North Sea on the ground water levels of the Waveney landscape is more in keeping with the argument put forward by Coles (1977) who, too, discussed the possibility of independent local ponding leading to the formation of deep channel peats. The early peats formed inland are seen in the age-depth line graph, represented here by the blue symbols. This possibly indicates the contribution of pockets of peat accumulation occurring due to local ponding concurrent with the principal forcing of sediment regime change from the changing North Sea water level. The role of the North Sea oscillations is clearly evidenced by the palaeoenvironmental data discussed above, as different patterns are seen from the coast moving inland with the cores at Caldecott Hall showing an environment much more responsive to the rise in sea-level than that further upstream at Stanley Carr and Beccles. This is especially seen in the beginning of clay formation after both Lower and Middle Peat, where wetland conditions prevail in the downstream cores up to 800 years before they are seen in the pollen records inland. The higher-energy environments and higher salinity evidenced at Caldecott Hall and Great Yarmouth are also indicative of a progressively less susceptible environment upstream. This supports the notion of two independent drivers for peat formation, the sea-level oscillations in the forming North Sea and inland ponding causing simultaneous peat accumulation near Stanley Carr and Beccles.

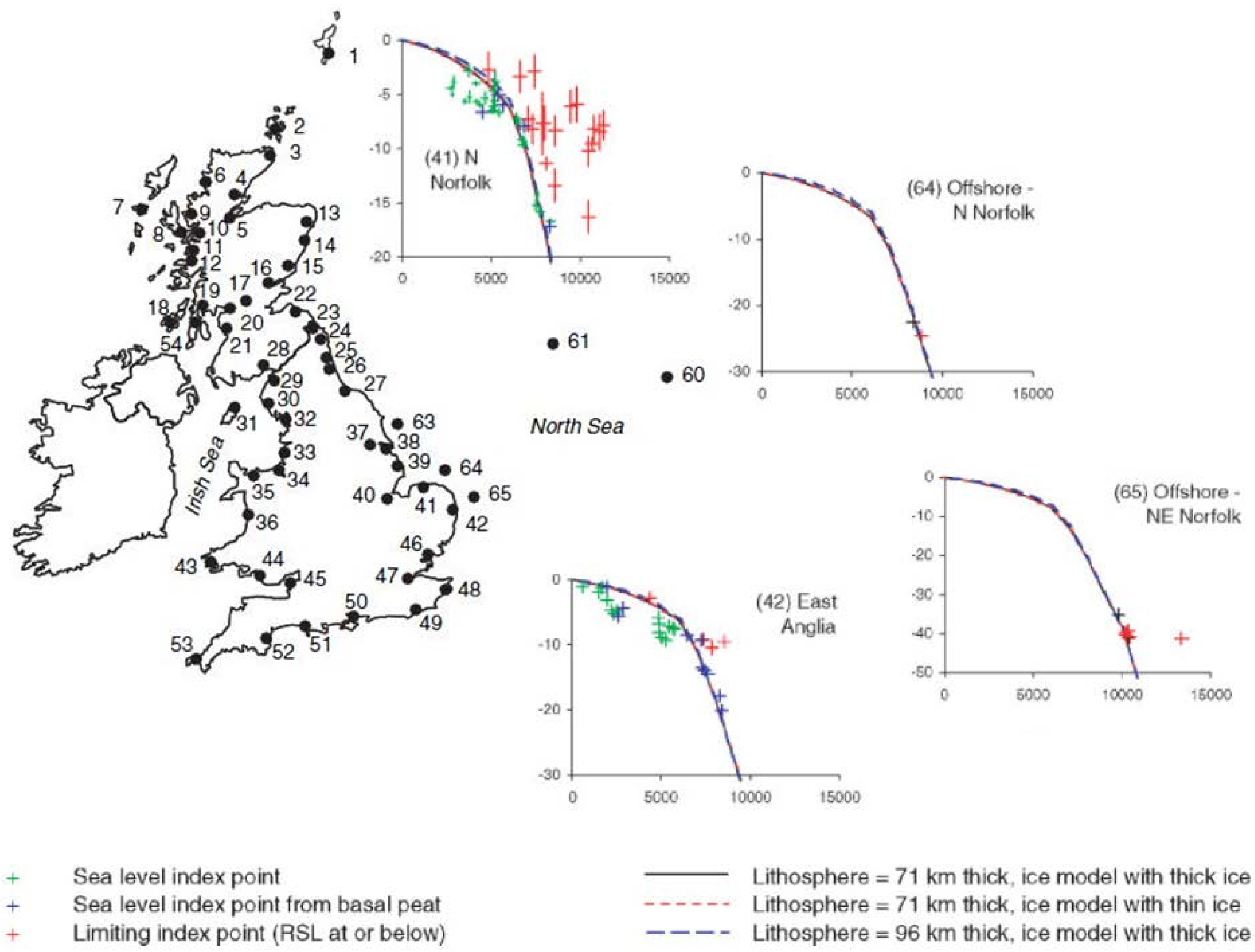


Figure 76. *Following from Shennan 2006, displaying Relative Sea Level Curves for the region surrounding the Waveney Valley for comparison with the Waveney Valley age v. depth graphs*

The dominant trend is, however, one of coastally increasing sediment age and depth with unequivocal correlation with regional sea-level rise. It is likely that the significance of this correlation was diminished by Alderton and Coles due to the deficiency of RSL curves available at the time. Both dissertations applied eustatic sea-level curves and found the correlation to be less substantial. However, by looking at the surrounding local expressions of North Sea sea-level change, the influence of this rise on the sediment regime of the Waveney landscape is clearly seen.

Lessons Learned

The initial model results show the strong possibilities for analysis and interpretation of the early Holocene palaeogeography. However, these outputs cannot generate reconstructions of the Mesolithic environment and should not be considered as such. The margins of error discussed above, even when quantified, negate any notion of an exact representation of the Mesolithic landscape. Even in the areas of highest data resolution where very little interpolation is required between data points, the resulting models do not reproduce the full reality of a varied and changing palaeolandscape. For the Waveney valley Mesolithic, a landscape with a robust density and distribution of borehole data, this is the forward edge of our current modelling ability, but by accepting these limitations we can produce very functional heuristic devices through which coastal community interaction with a dynamic environment can be interpreted. Through the three-and two-dimensional outputs created in this project we can summarize the entirety of the available data archive in succinct graphical packages through which we can more usefully explore and digest this information. From these models we can frame an understanding of a sensory, active engagement with this environment. Between these static images showing key transitional points in the evolution of this micro-scale region, we can then interpretively connect the dots to discuss process, dynamism and rate of environmental change.

In producing these heuristic devices, the tension between creating aesthetic images which minimize the appearance of data artefacts and transparently displaying the limitations of the modelling process comes to the fore. By mitigating obvious flaws in the dataset and modelling process the confidence interval in interpretation is reduced. However, if this is done inappropriately, then the margin of error taken into account when forming conceptions about Mesolithic life from the modelled outputs can be artificially low. For instance, there is a temptation to ‘prettify’ many of the interpolated outputs in this study. Where the 5% maximum distance constraint has been used in Kriged and IDW 3D models and isopachs, the resulting images show a bull’s-eye or circular effect. These illustrations could be clipped and conformed along the modern topography to constrain Holocene infill along the known Waveney and Yare floodplains, and to build-in the sharper slope on these river banks. However, that creates a logical fallacy where modern geography is used to inform a palaeolandscape. Therefore, it was decided that the best images smoothed and reduced data artefacts where possible using the extant borehole records, but not using modern geography as an ill-suited constraint. Vitally, this grounds the earlier arguments from Chapter Three against using modern spatial considerations to define the constraints of prehistoric interpretations in the practicalities of the Waveney valley dataset. Thereby the geological modelling process has created a series of graphical outputs ready for incorporation with additional early Holocene environmental proxies.

Palaeoenvironmental Data

The geological models provide information on the shapes and compositions of the ground surface during the Mesolithic and give us an indication of the energies of these environments; however, the concept of texture comprises a wider variety of influences. We have a limited number of data sources through which to explore these further dimensions. The palaeoenvironmental proxies of the pollen record, diatom and foramifera data contain vital information about vegetational components of this texture and about the nature of the water dominating the early Holocene Waveney landscape. Coles (1977) discusses the diatom record in the river Yare valley as an indicator of the palaeoenvironment. Alderton (1983) provides a detailed analysis of the pollen and diatom records at five sites down the profile of the river Waveney. Both of these projects, and the literature review provided by the SRV project (Hill 2008) discuss the nature of the pollen record from the Younger Dryas and early Holocene over the wider Waveney landscape. These data can be amalgamated with our understanding of the local palaeogeology to begin to illustrate an understanding of the changing environmental texture perceived by Mesolithic coastal communities interacting with this landscape.

Archaeological Data

To establish Mesolithic habitation of the Waveney landscape and to examine spatial patterns in the remaining artefact record, data on the archaeological resource in the Waveney landscape were collected to augment lithic scatter information used in selecting this micro-scale region for further investigation. Of the information applied earlier, Wymer's (1977) gazetteer was specific to the Mesolithic period only. This catalogue is based on the examination of collections in museum or private possession, published references and any other available source of information (Wymer 1977). It was created to address the lack of publication and interpretation of information on Mesolithic artefacts in Britain (Wymer 1977). Most of the 5313 finds recorded in England and Wales are surface discoveries and are presented as assumed unless otherwise specified. A broad classification of the tool typology is included in the gazetteer, which presents the number of cores, scrapers, adzes, picks, blades, gravers, microburins, and microliths and other typologies discovered in each scatter. Where known, the material, bone, wood or antler, is noted. In the text accompanying the gazetteer, the difficulty and resultant possible error in differentiating Upper Palaeolithic tools from Mesolithic finds based on typology alone is discussed.

By contrast, the National Monuments Record (NMR) provided a greater density of data, 3136 records for the more restricted search rectangle applied. However, this catalogue includes both Palaeolithic and Mesolithic data and often does not include a description or quantification of the artefacts found in each location. Historic Environment Record (HER) information was provided from Suffolk county council for artefact information within a selected rectangle. While this information did contain a quantification of the number of artefacts found in each scatter, details on the typologies of these artefacts were rarely included. This record was generated from a general 'Prehistoric' search as typologies were not always interpreted for time period. Of the 150 records returned in this search, 43 were specified to the Mesolithic period, 24 to the Palaeolithic, 1 to the Neolithic and the rest to an indeterminate Prehistoric age. Similarly, the finds HER supplied by Norfolk County Council were not often dated strictly to the Mesolithic. Of the 256 records returned, 10 were determined to be Mesolithic scatters, 11 were given an earliest age of Mesolithic, 21 were specified as Palaeolithic and the remainder were classified as broadly Prehistoric. Following from the Wymer (1977) Gazetteer, information from the NMR and HERs was assumed to have been derived nearly exclusively from surface scatters. No Mesolithic archaeological excavations have taken place in the Waveney valley landscape.

The assembled database of archaeological information was then plotted into this GIS. As the Wymer (1977) gazetteer and the Suffolk County Council HER both contained information on the number of artefacts found at each location, this information was plotted with proportional symbology to graphically display the size of each lithic scatter against both the modern topography and the pre-Holocene landscape model.

The Waveney Valley Mesolithic

The geological models provide information on the changing shape and texture of the ground surface. The age-depth graphs of dated sediment samples and the comparisons of these with local RSL curves allow us to begin to understand process and the driving forces causing change. The palaeoenvironmental data gathered for each time step will now allow us to collate vegetational and water-quality data with the palaeogeography; illustrating the signatures of the effect of changing sea-level and sediment regimes on the human-scale environment. The spatial distribution of the artefact records, examined in conjunction with these data sources, then helps develop an awareness of where and how Mesolithic communities actively engaged with these environments through the traces both intentionally placed and discarded in this landscape. Through this cross-disciplinary look at the material record, Chapter 6 will refine our story of the Mesolithic in the Waveney valley, and therefore within the broader Region V of the southern North Sea basin.

Chapter Six: Micro-Scale – Interpretation

While Chapter 5 presented the evidence accumulated for the micro-scale case study and the methodology by which these data have been considered, Chapter 6 will consider the results and what they can tell us about the 'e-scape' (Finlay 2004) of the Waveney Valley. Nilsson (2003) pondered the questions of how red the rowan berry was in the Mesolithic, if this was something possible to ask of the record and if it was a meaningful exercise to pursue. Along those lines, Chapter 6 will not pretend to an environmental reconstruction, but will explore what the evidence can tell us about the shifts in the environment and how these might have impacted upon the experience of people dwelling within the Waveney landscape as these changes took place. The layers of the Breydon Formation will be used as key time-steps in the sequence of environmental change of this river valley.

By questioning the value of the accumulated evidence for interpreting the texture (Ingold, Evans) of the study area, and in, thereby, characterising a time period, this chapter also explores the definition of a 'micro-scale' for research into the Mesolithic environment. The patchwork effect of environmental change on the Waveney landscape illustrated by the accumulated evidence, calls into question the idea of what we mean by 'micro-scale' in this context. We must ask what is a reasonable spatial definition of a micro-scale project.

From these considerations, this chapter will end by considering the contributions of this case-study not only to the larger themes of this thesis, but also to the wider study of region V and the Mesolithic in northwest Europe.

Archaeological Context

The biggest limitation to the accuracy of interpretations drawn from the evidence accumulated for this case study lie in the nature of the archaeological record in this region. No in situ Mesolithic artefacts have been recorded for the Waveney valley. Therefore, the precision of the dating possible is reduced; only a typological classification can be assigned to suggest the time period of the surface scatter artefacts. Many of those recorded are, in fact, only listed as 'prehistoric' and rarely have the artefacts been attributed to a specific part of the Mesolithic; early, middle or late. However, since it would be impractical and a waste of archaeological resource to only interpret in situ artefacts, the potential of the extant record must be considered as well as its limitations. In this case, the surface scatters of the Waveney valley do still sustain archaeological interpretation when juxtaposed with the palaeoenvironmental record for the region. The classification of the substantial record of surface-scatter lithics from the Upper Palaeolithic through to the Neolithic, supports a hypothesis of persistent Mesolithic inhabitation of the Waveney Valley, and allows analysis of spatial trends in the distribution of these artefacts which can be considered in conjunction with the environmental conditions experienced through the Mesolithic at these sites.

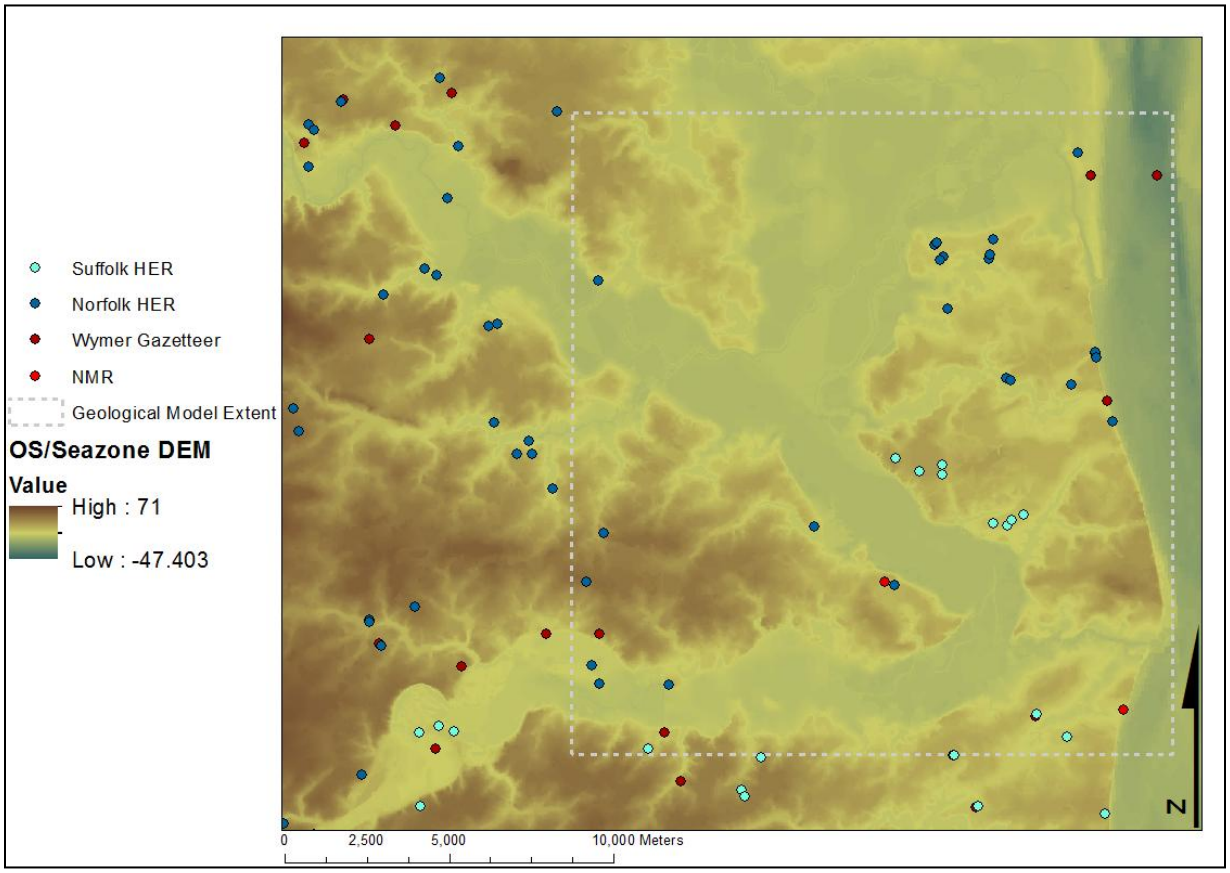


Figure 85. *Archaeological artefacts records plotted against OS/Seazone mosaiced DEM*

Two trends become apparent from a GIS analysis of the archaeological record for the Waveney Valley. The first is a possible preference for settlement on the wet-to-dry land edge of the Rivers Waveney and Yare. Especially nearing the coast, the majority of artefact scatters sit along this transitional line. This is likely related to the better preservation and greater chance of discovery on the higher landscape. However, the increase of lithic scatters discovered in the wetland further upstream in the river valleys, especially around Stanley Carr and Beccles in the Waveney valley, may also be attributed to the greater stability and inhabitability of the low land of these regions. As seen from the initial geological modelling results (Chapter 5) and in discussion below, the floodplain reach, especially downstream from Boundary Dyke, was substantially more susceptible to marine transgression and regression; the isopach outputs for the Breydon Formation demonstrate the reduced effect of these marine oscillations in the Upper Waveney geography. Further downstream, inhabitation of the lowest lying Waveney landscape would have been more difficult due to the rapidly and dramatically changing environmental regimes. Too, with strong tidal conditions here, evidence for such inhabitation may have been diminished.

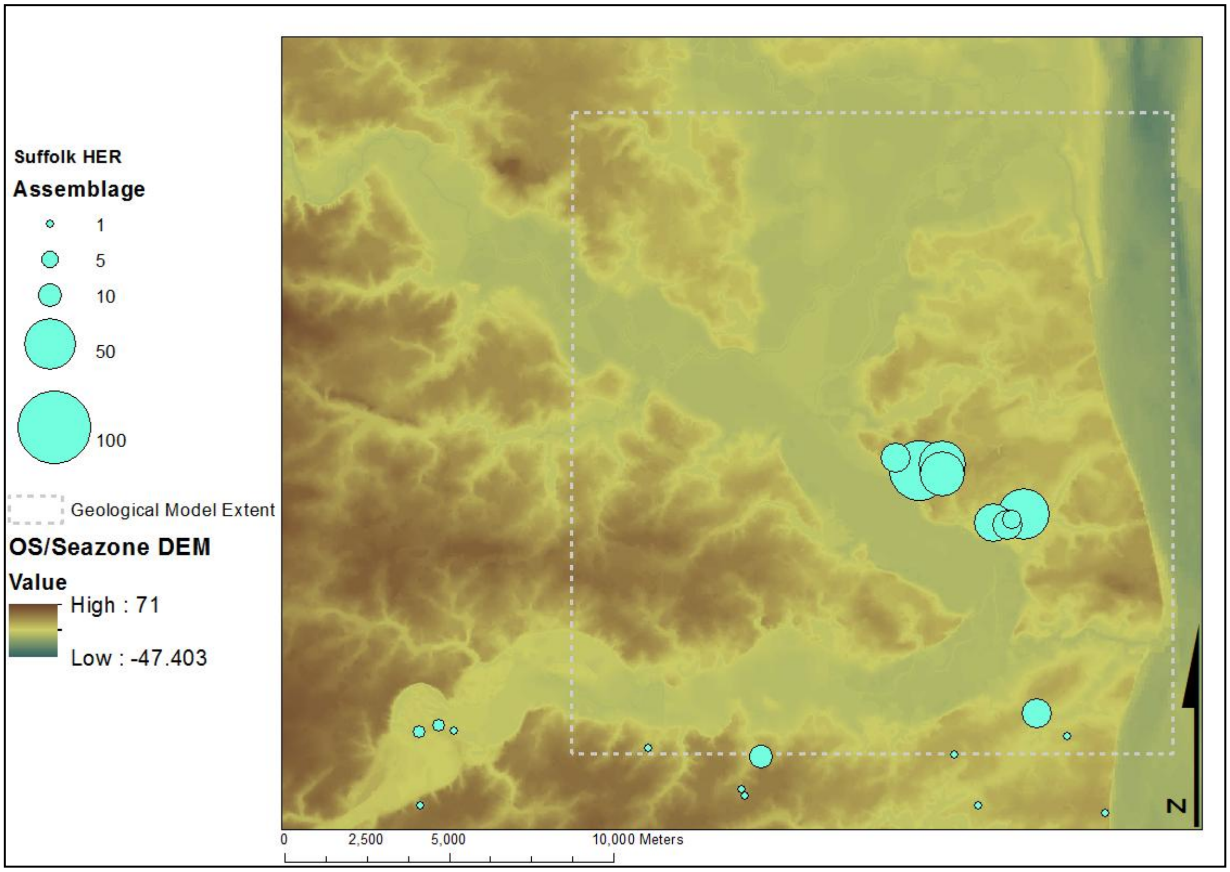


Figure 77. *Suffolk HER artefact record displayed with symbols proportional to the assemblage size*

The second spatial pattern can be seen most clearly in the Suffolk County Council HER dataset as this records the assemblage size of lithic scatters found. A qualitative trend can be seen in this data of an increase in assemblage size towards the coast. While inland assemblages often range from one to five finds, further towards Somerleyton Marsh, these increase to <100 finds within the assemblages. Looking further to the coast the descriptions of lithic scatters recorded in the Norfolk County Council HER, these appear to again reduce to single finds with very few multiple finds alluded to downstream. This stretch, near Somerleyton Marsh, protected from the strong tidal influences seen further seawards yet still definitely within the scope of influence of the forming North Sea, may represent a preferred region for both Mesolithic deposition of flint artefacts and preservation of these scatters. These two spatial patterns allow us to consider the palaeoenvironmental evidence in the context of a basic understanding of where, within the Waveney Valley, Mesolithic people likely dwelled. We can then explore ideas about the texture of the environment in places where we can establish that they did interact with the landscape on a one-to-one level. In doing this, the archaeological record, despite its chronological limitations offers us a means of moving from an interpretation of the environment which is separated from the people who perceived it, to one which offers us a better understanding of the experiences of these individuals and communities. The point of this case study, to interpret perception of the environment on the human-scale is, therefore, better achieved than it would be by a purely environmental approach. This approach also allows us to confront issues which are a persistent component of archaeology in Region V where, as seen in Chapter 4, in situ archaeological artefacts are not as readily accessible as they are elsewhere in the Southern North Sea basin (e.g. Region III). This provides a further corollary to the data being garnered from the submerged North Sea landscape where a limited amount of data will, at least initially, need to be interpreted to its fullest benefit without over-construing it.

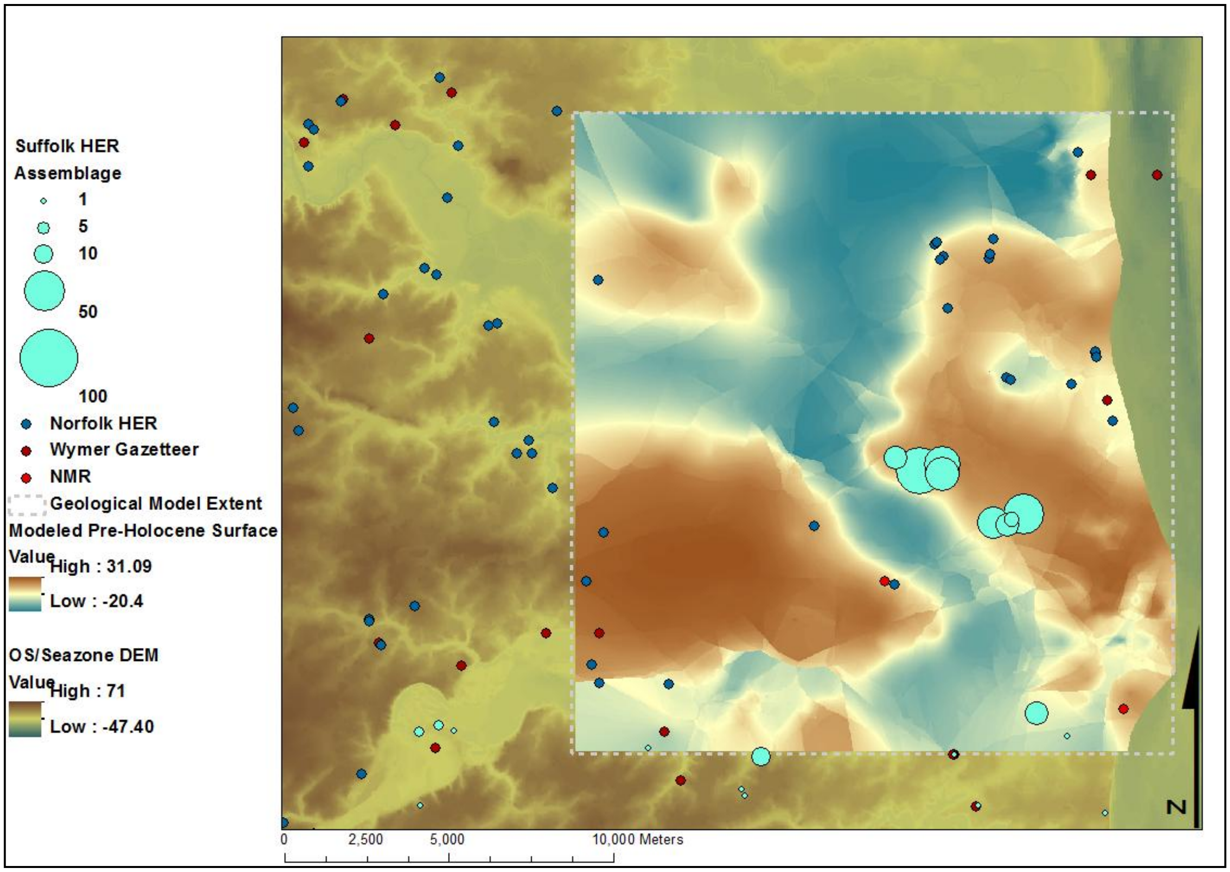


Figure 78. *Archaeological artefact finds displayed against modelled pre-Holocene topography with a modern DEM background*

Geological Context

The most dramatic environmental change which occurred during the Mesolithic occurred in the alluvial fan of the river. The generalized topography of the modelled pre-Holocene land surface strongly resembles the modern Digital Elevation Model (DEM) (Figure 79). The location of the waterways, the Waveney and Yare and their tributaries, are equivalent. While the process of modelling smoothes out localised details, the overall stability of the shape of this landscape is emphatic. Chapter 5 discussed the artificially heightened valley floor elevation in the modelled surface, which is reiterated in this discussion as the total elevation range in the pre-Holocene surface model is 51.49m while it is only 62.55m in the modern DEM. This is important in noting the comparatively small range in elevation values seen over the lateral extent of the study area. Mesolithic communities inhabiting this landscape would have experienced relatively flat land in this region. However, despite this flatness, the geography of this river basin still restricted the influence of rising North Sea waters to the riparian corridor of the Waveney and Yare. Changes in elevation and the composition of surface sediments occurred predominantly in this wetland extent. Figure 79, indicates that the majority of landscape shape alteration occurred within the alluvial fans of the rivers Waveney and Yare. The green, representing the modelled pre-Holocene surface only crops out at the same elevation as the modern DEM in the higher surrounding landscape despite the synthetically high elevations of the modelled pre-Holocene wetland. These comparisons provide a visual demonstration of the location of the greatest degree of change in the Waveney valley; this is a landscape which was dominated by alterations to its waterways throughout the Mesolithic. This understanding, coupled with the locations of known Mesolithic artefacts, discussed above, has steered the essential focus of this case-study to the landscape nearest the river itself.

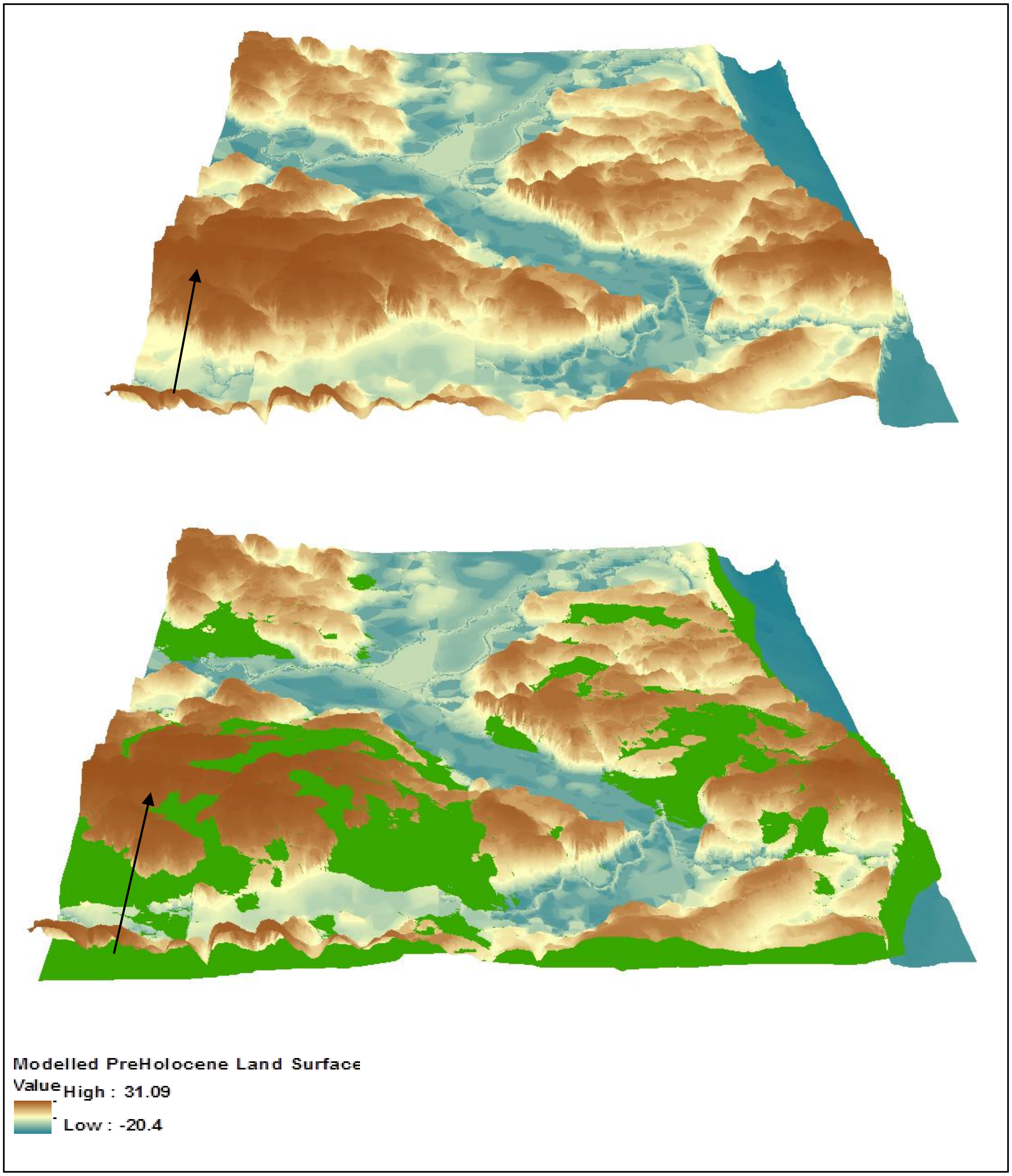


Figure 79 a. *Modern DEM assembled from OS tiles provided by Edina Digimap.* b. *comparison of modern DEM with modelled topography emphasizing the similarities between the two layers; green denoting the modelled output. (Bottom left to bottom right corner = 18334.5m)*

Palaeoenvironmental Context

The interpretation of the evidence accumulated for the Waveney Valley case study relies on the premise that the environmental conditions experienced during the Mesolithic affected more than the practical, resource availability and ease of access, considerations of life in this time period, and in fact had an equally or more important impact on the identity of communities and individuals. The theoretical justification of this stance has been discussed at length in Chapter 2. Relevant to the specific types of data available in this case study, the effects of vegetation on the visceral perception of the landscape will be considered here. Trees and other tall vegetation frame the landscape by providing structure and shape to the world above our heads. They change access to light, to the unbroken sky, to privacy, safety and places to hide away. These are emotional components of the landscape, addressed by David Hockney (2012) in his exhibition featuring images of the seasonal changes to the landscape of the Yorkshire Wolds. As they change, the leaves of trees can change the context of the sky, altering its appearance as seen through varying thicknesses of foliage and different colours. In full leaf, trees can darken the landscape, inhibiting light and dulling colours, where as in winter, when branches are bare, they can provide a very angular structure to the view; immediate components of the landscape with which people interact during the course of their daily, habitual practices. As vegetation alters over the landscape, Hockney (2012) argues that it lends a further temporality to the landscape, not merely tied into a seasonal cycle. This sense of time is introduced through memory of how the vegetation looked in the past; in past seasons and in past years. As he explains, "because you have the memory of last winter, but you are seeing more this winter. 'I didn't notice that last winter'" (Hockney 2012), time is marked in the landscape through our experience and perception of it. Therefore, large scale changes in the vegetation, as seen through the Mesolithic in the Waveney valley, would have had a large impact on the psyche of the people who dwelled within it.

Figure 80. Example of the visual impact of the different colours of vegetation at Caldecott Hall today.

Model Limitations

As discussed in Chapter 5, the models used in this study are meant as heuristic devices only and have been left to intentionally show the inaccuracies of the modelling process. These images have not been cropped and rendered to create more refined images as the limitations of the models need to be transparent in order to accurately assess how they compare with the published descriptions of the Breydon Formation sequence. Had the models been adjusted to look better, many of the differences with the published accounts may have been obscured; given that this is a first amalgamation of several different data sources to create an archaeologically meaningful look at the Waveney Valley, it was decided that this was more important than creating more polished images. However, this should be taken into account in evaluating the images comparing the locations of the archaeological artefacts with the layers of the Breydon Formation.

Time-Steps

First Holocene: Image of enduring stability

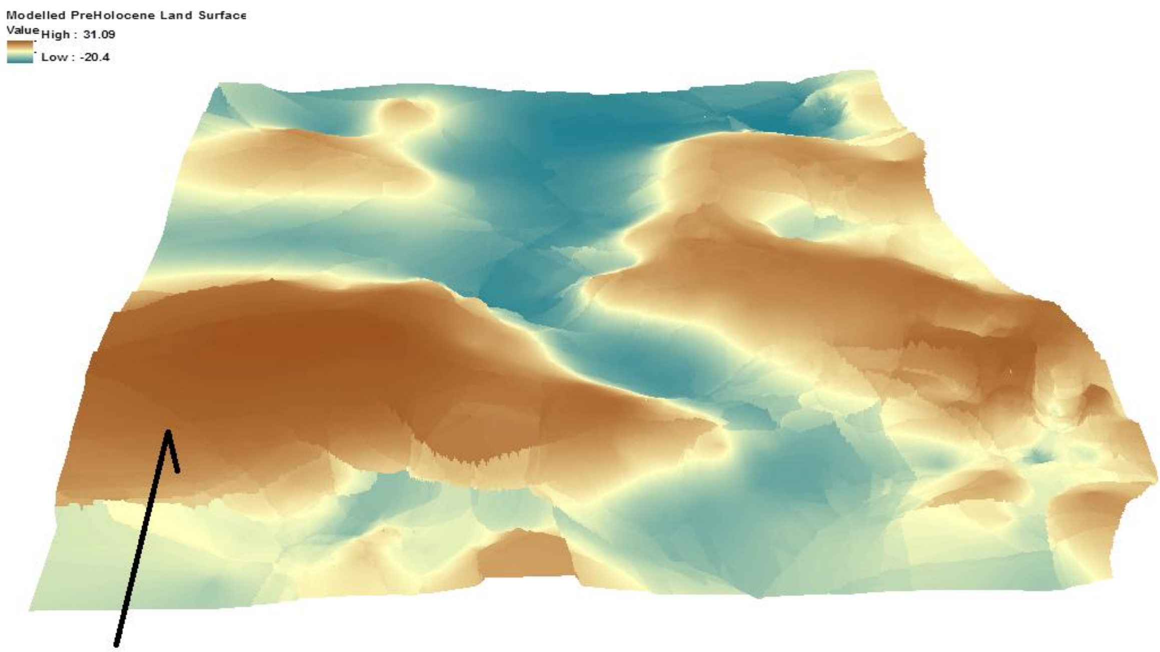


Figure 81. *Modelled pre-Holocene land surface, created according to methodology presented in Chapter Five and displayed with a vertical exaggeration of *40 to emphasize topography. (bottom left to bottom right = 16785.5m.)*

In the Waveney Valley, the tempo of change from the formation of Anglian Till through to the beginning of the Holocene had been much slower than that which occurred during the Mesolithic period; the deposition of Devensian Terrace Gravels near the North Sea mouth of the Waveney signifying the one noteworthy, post-Anglian, pre-Holocene alteration of this landscape. Therefore, at the start of the Mesolithic, these gravels would have lined the Waveney banks near the North Sea mouth whereas elsewhere, the soils would have comprised much older formations which had been compositional static beyond human memory for the region.

The core samples collated for this micro-scale study show that these older soils represent the Lowestoft Till, Corton Beds, Kesgrave and Bytham Sands, Crag and Upper Chalk formations (Figure 82); this is substantiated by the geological summaries for the area (Arthurton 1994 and Moorlock 2000).

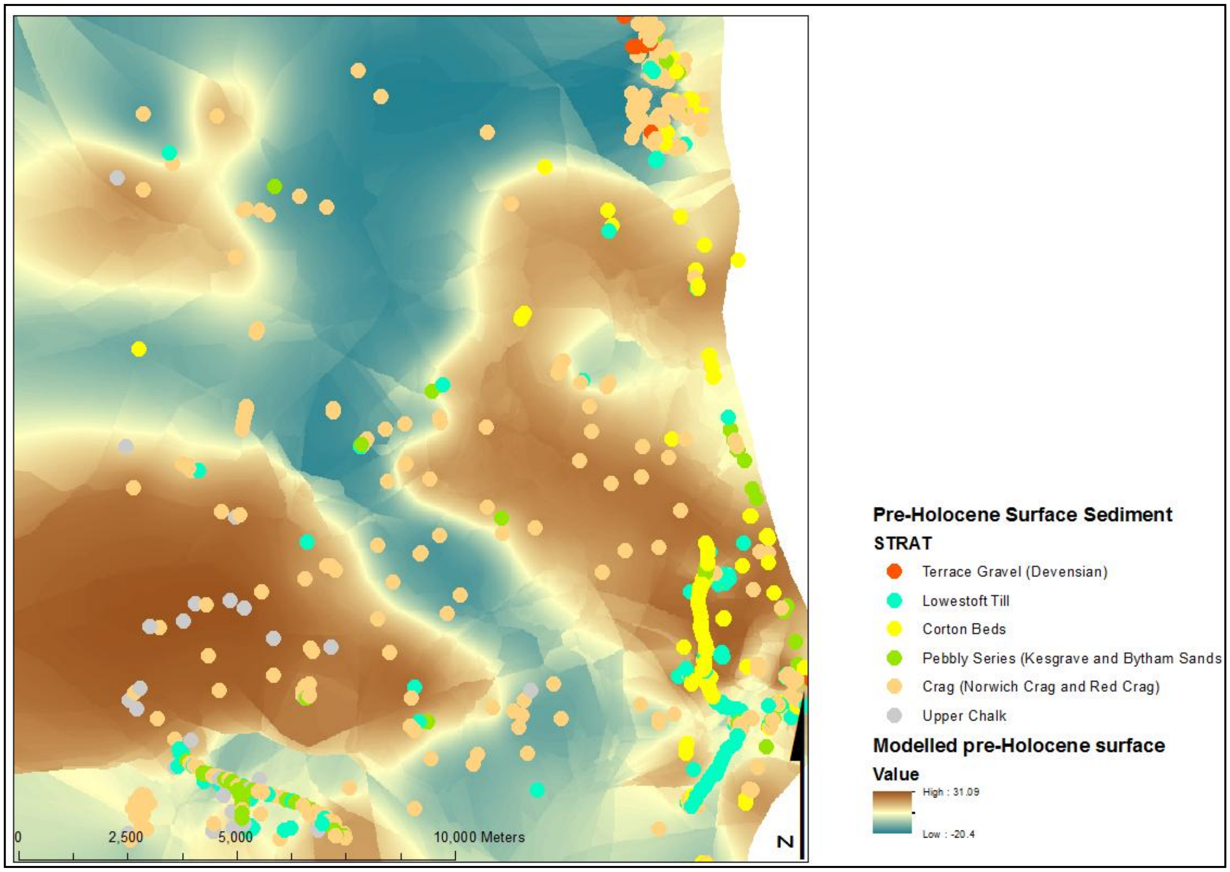


Figure 82. *GIS output showing the sediment composition of the land surface at the start of the Holocene as indicated by boreholes collated according to methodology discussed in Chapter 4. Displayed against modelled pre-Holocene surface.*

This model indicates that Crag would have been the parent material for the majority of the soils on the surface of the initial Holocene landscape, forming the dominant texture underfoot at the beginning of the Mesolithic period. Along the eastern margins of the study area, lining the modern coastlines, the Kesgrave and Bytham Sands and Corton Beds mix near what would have been the surface of the pre-Holocene landscape. Lowestoft Till can be seen through, and along the edges of the alluvial fan, and in the low-lying pocket to the south-east of the study area. Upper Chalk, heavily buried under London Clay in the east of the study area, increasingly outcrops inland, especially near Beccles.

Artefacts of the data record and modelling must be taken into account in interpreting the composition of this land surface. As has been discussed, core samples taken in the lower lying, wetland areas of the Waveney landscape, especially further towards the River Yare, were much shallower than those taken from higher and drier sections. Often these shallower cores were halted at or before reaching the Lower Peat of the Breydon Formation, meaning that they would not have been deep enough to record the earlier, underlying sediments. This is most likely to have influenced the modelled distribution and density of Lowestoft Till and the Terrace Gravels which probably would have been more prevalent in the lower lying Waveney Valley than is suggested by the model. This likelihood is substantiated by the deeper cores taken at the coastal outflow of the Waveney and Yare, where the highest modelled concentration of Terrace Gravels can be seen. Equally, Lowestoft Till, can be seen in the majority of the deeper cores at the inland and coastal reaches of the Waveney lowland, suggesting it is more prevalent in the stratigraphy of this valley than indicated by the current borehole records. However, a generalised image of the soils at the surface, lying just beneath now-eroded topsoils, of the earliest Holocene Waveney valley can begin to be formed, giving us some insight into the experienced texture (Evans 2004) of this landscape.

Norwich Crag comprises well-sorted fine to medium grained green sands capped with an orange to pale white layer. Red Crag, similarly would have contributed fine to medium sands, though these would have had a reddish appearance. Upper Chalk would have appeared as a variously firm to soft white limestone with frequent flint nodules. The Chalk fraction would have been carried out through the Corton Beds which present as a fine to medium grained sand unit, yellow to buff coloured, with chalk fragments. The Kesgrave and Bytham Formations, Lowestoft Till and Devensian Terrace Gravels would have each been primarily composed of coarse sands, gravels and pebbles, though Lowestoft Till, along the alluvial fan of the Waveney would have had a higher percentage of silts and clays mixing with the sandy gravels in this region. Overall, despite the different formation processes which created these stratigraphic units, the overall presentation of the soils at the surface of the first Holocene landscape would have been of fine, sorted sands inland and upstream in the valley, coarsening to sandy gravels and even coarser pebbles downstream and east across the study towards the North Sea coast. Inland around Beccles, the white limestones of Upper Chalk would have been much more prevalent than the smaller inclusions visible mixed in with Corton Sands. Walking over this landscape, the feel and appearance underfoot may have coarsened as people travelled downstream from the fine sands to the three-dimensional roughness, the sharper quality of the gravels and pebbles downstream. Immediately along the river beds, the softer, stickier silt and clay percentages of Lowestoft Till may have been apparent, especially further upstream, near Beccles where lower-energy environments are suggested both by the distance from the North Sea mouth, and by the presence of fine, well-sorted sands. Where visible, the sands, gravels and chalks would generally have been of neutral, pale colours – white and buff, with occasional patches of the striking brick-red colour of Red Crag sands. Even though likely buried under topsoils at the time and perhaps not visible at the immediate surface of the pre-Holocene landscape, these sediment units would have been exposed in places throughout the landscape through natural processes: trees turning over, erosion, slumps along river banks, and through human interactions: pit digging, even kicking at the ground to turn up what's underneath. The appearance of the soil in these processes would have been different in the upper valley – fine sands spilling out, clays wetter and more mouldable, than in the lower valley – a coarser, less homogenous gravelly, pebbly, sandy mix. Digging in it, observing it, touching it, these soils, present at the same moment in the landscape, would have created a lateral diversity across this study area.

The soil types also indicate a higher energy, faster currents and stronger winds, in the sections of the study area which contain coarser sediments. The fine grained Crag sands and Lowestoft Till clays and silts upstream would have required a lower energy environment for deposition and conservation. Therefore, moving along the river, people would have encountered these different conditions, even within the limited extent of this Waveney valley study area.

The palaeoenvironmental record is sparse for this time period due to the sandy, gravelly composition of the surface sediments at the time, preserving very little organic evidence. However, the first depositions of basal peat indicate that the dominant vegetation was *Pinus* (pine) with a notable fraction of *Corylus* (hazel) (Alderton 1983). The five pollen samples from Alderton's (1981) work which indicate the strong growth of pine trees match well with the prevalence of sandy, chalk surface soils suggested by the stratigraphic modelling for this time-step; pine species flourish in calcareous and sandy soils such as those of especially the Upper Chalk, Crag and Corton Formation (Chinery 1987). At Fritton Decoy, however, the main tributary of the river Waveney, separated from the main flow of the river system and hence more sheltered, Lower Peat growth was initiated under a protected carr environment where *Alnus* (alder) was the dominant species (Alderton 1983). Alder growth would likely have been well suited to growing the Lowestoft Till formations as it fares best in moist but well-drained soils (Chinery 1987); the intermixed moist clays with drainage-promoting sands and gravels would likely have created such an environment, especially in the more protected area around Fritton Decoy where clay deposition would have been supported. Jennings (1951 and 1955) describes the lowest layers of Lower Peat as having formed generally in the presence of a carr environment where *Pinus, Salix* and *Carex* were the dominant species but gave way to a very narrow zone of *Phragmites* fen and *Typha* reed swamp in the approach to the rivers Bure, Yare and Waveney. This highly restricted strip of wetland vegetation on the river banks points to the dry conditions of the landscape at the start of the Mesolithic, before the effects of North Sea inundation became dominant characteristics of the environment in this river valley.

For people dwelling within this landscape, most of valley at this time was dominated by evergreen pine trees, relatively constant in landscape, green and less changeable in colour, the amount of their foliage, their size. At Fritton Decoy, the larger percentage of hazel trees would have marked this area out as unique. The trees would have changed with the seasons in colour and density, in the number of leaves, in how much they impeded the view and movement through them. Here, the timing of the seasons would have been strongly marked by the hazel trees as it would not have been elsewhere in the study area. Moving through these types of vegetation would have felt and appeared different, the spinney appearance and feel of the pine trees contrasting with the softer, leafier hazels. The artefacts found in this section of the study area would have been deposited in a sheltered environment distinctive in the landscape around it. The limited strip of *Phragmites* along the river's edge would have meant that there would have been very little run-up to the river itself; the dry land vegetation would have extended almost to the water. These trees would, therefore, also have been visible from the water, not distant or hidden from the eye by banks of tall *Phragmites* reeds. The view from the river would have been of woodland, very different at the beginning of the Mesolithic than it is now or was later in the study period. The locations of the greatest amounts of archaeological finds indicates that early Mesolithic communities dwelling in this landscape deposited objects along this wetland edge where sands and gravels mixed with the clayey Lowestoft Till and pine forests met a thin band of reed swamp vegetation on the river's edge.

Lower Peat

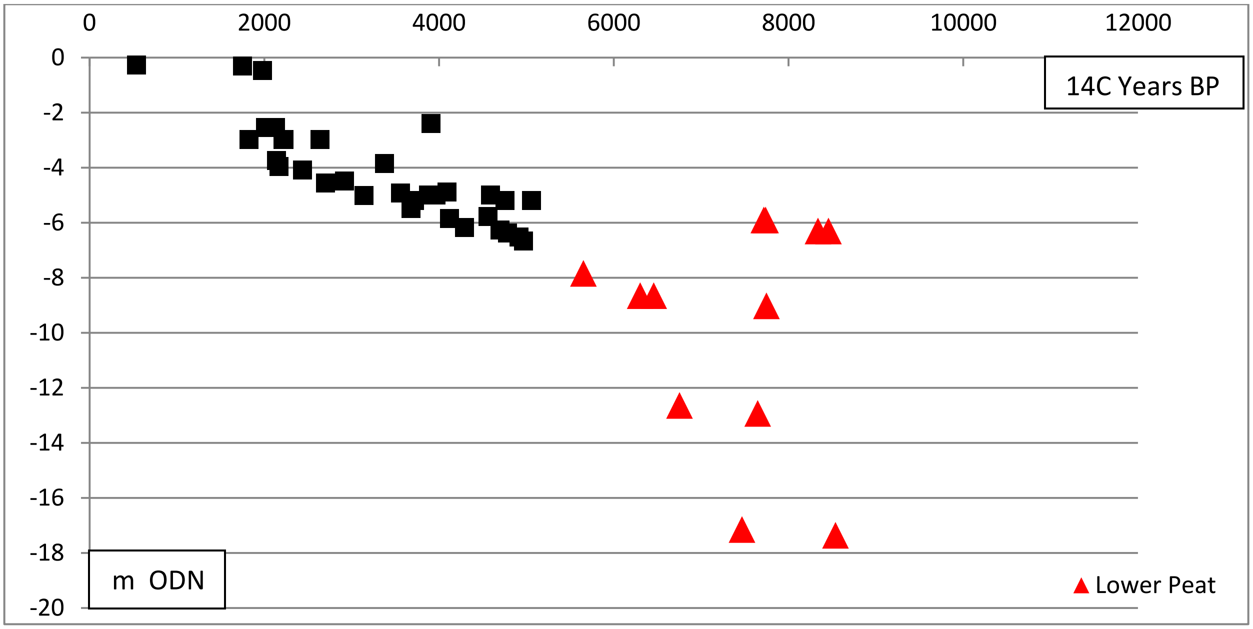


Figure 83. *Graph displaying age versus depth of dated boreholes, highlighting dates taken from Lower Peat material Dated samples from Alderton (1983); 14C dates BP derived from organic material.*

The Lower Peat layer records the first substantial changes to the Mesolithic landscape in the Waveney Valley. This is the least extensive unit of the Breydon Formation, impersistent and entirely buried. Its scant deposition limits the amount of analysis and interpretation possible for this time step.

As discussed in Chapter 5, Lower Peat was formed concurrently near the North Sea mouth at Great Yarmouth and inland near Beccles. This is likely a result of to two related processes in the Waveney landscape, one due to increasing ground-water levels due to the impact of the rising North Sea waters, and the other due to localised ponding inland. Contrary to Alderton's

(1983) argument that no Lower Peat is present in the upper Waveney valley, a cluster of the upstream boreholes collated for this project shows the presence of this layer near Beccles, though it is highly discontinuous at this distance upstream. The isopach shown in Figure 85 illustrates a mid-valley profile thickening of Lower Peat from 0.3m downstream to 1.1m near Boundary Dyke. However, the thickest incidence of this layer is seen in Cole's (1977) peat islands which increase up to 2.1m in thickness inland in the River Yare; though, Figure and Figure suggest that this is not a consistent trend. The greater thickness and extent of Lower Peat accumulation in the mid-Waveney Valley is possibly due to a combination of optimal peat-forming conditions at this location and the inland-thinning trend seen in both Upper and Lower Clay which would, therefore, cause less deterioration and compression of Lower Peat in the mid-valley.

Figure 84. The sheltered environment and deciduous trees at Fritton Decoy today.

The limited amounts of Lower Peat available for palaeoenvironmental sampling show that it comprises a woody peat with clay and silt deposits and estuarine and sub-tidal mollusc inclusions indicating the influence of the rising North Sea during the earliest peat growth closer to the palaeoshore line. At Fritton Decoy, however, where Lower Peat formation occurred under the pre-Holocene influence of a protected, deciduous, *Alnus* vegetation, the environment remained a stable carr environment with no evidence of transition to a fen or reed swamp ecology of the type that would herald the rapid inundation by estuarine conditions that would arrive with the deposition of Lower Clay. Here, change was sudden and showed no intervening sequencing as was seen through the rest of the valley. As *Pinus* species declined in the higher, dry land surrounding the river valleys, deciduous trees such *Alnus* increasingly expanded (Alderton 1983) in response to the greater access to water and suitability of swiftly draining soil (Chinery 1987)

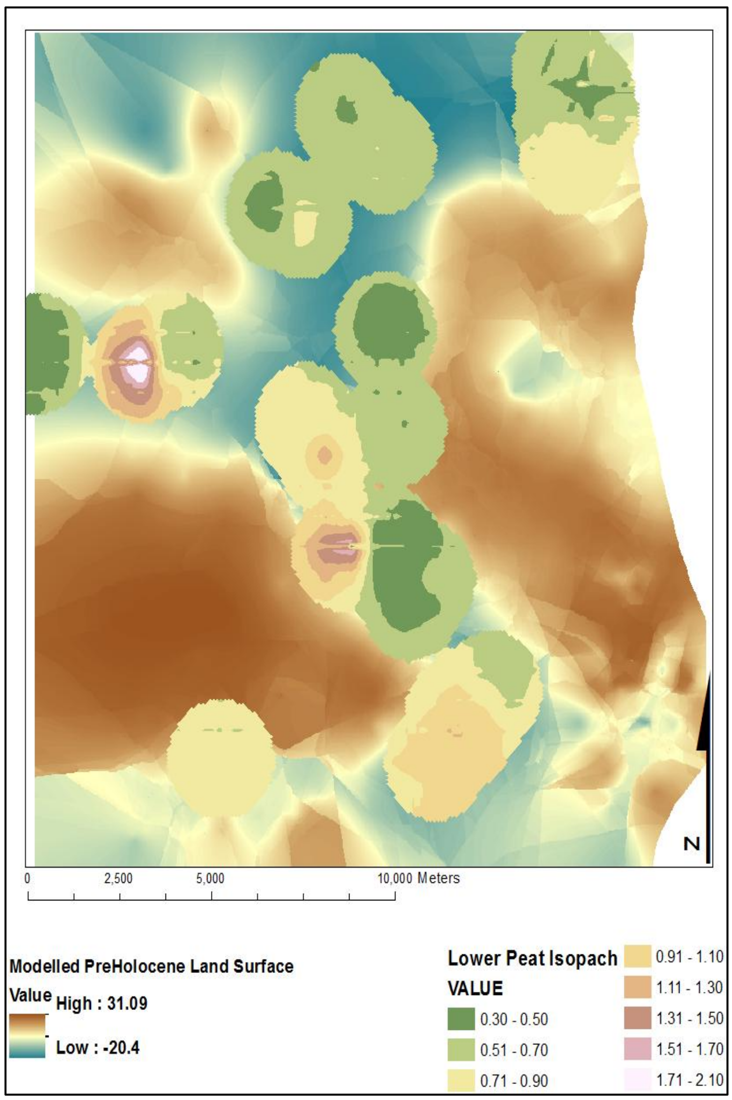


Figure 85. *Lower Peat Isopach against modelled pre-Holocene land surface created as described in Chapter Five*

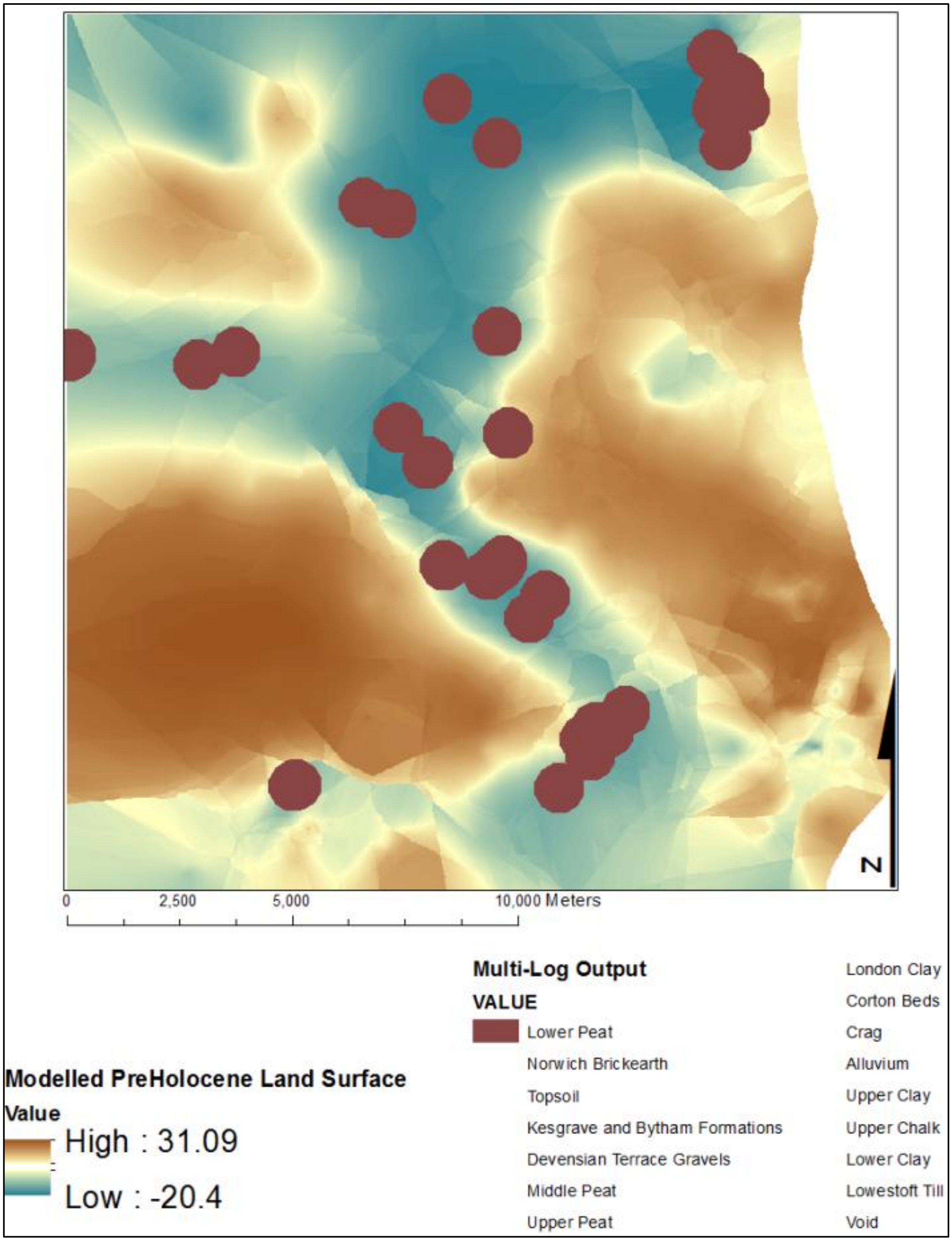


Figure 86. *Lower Peat multi-log output against modelled pre-Holocene land surface*

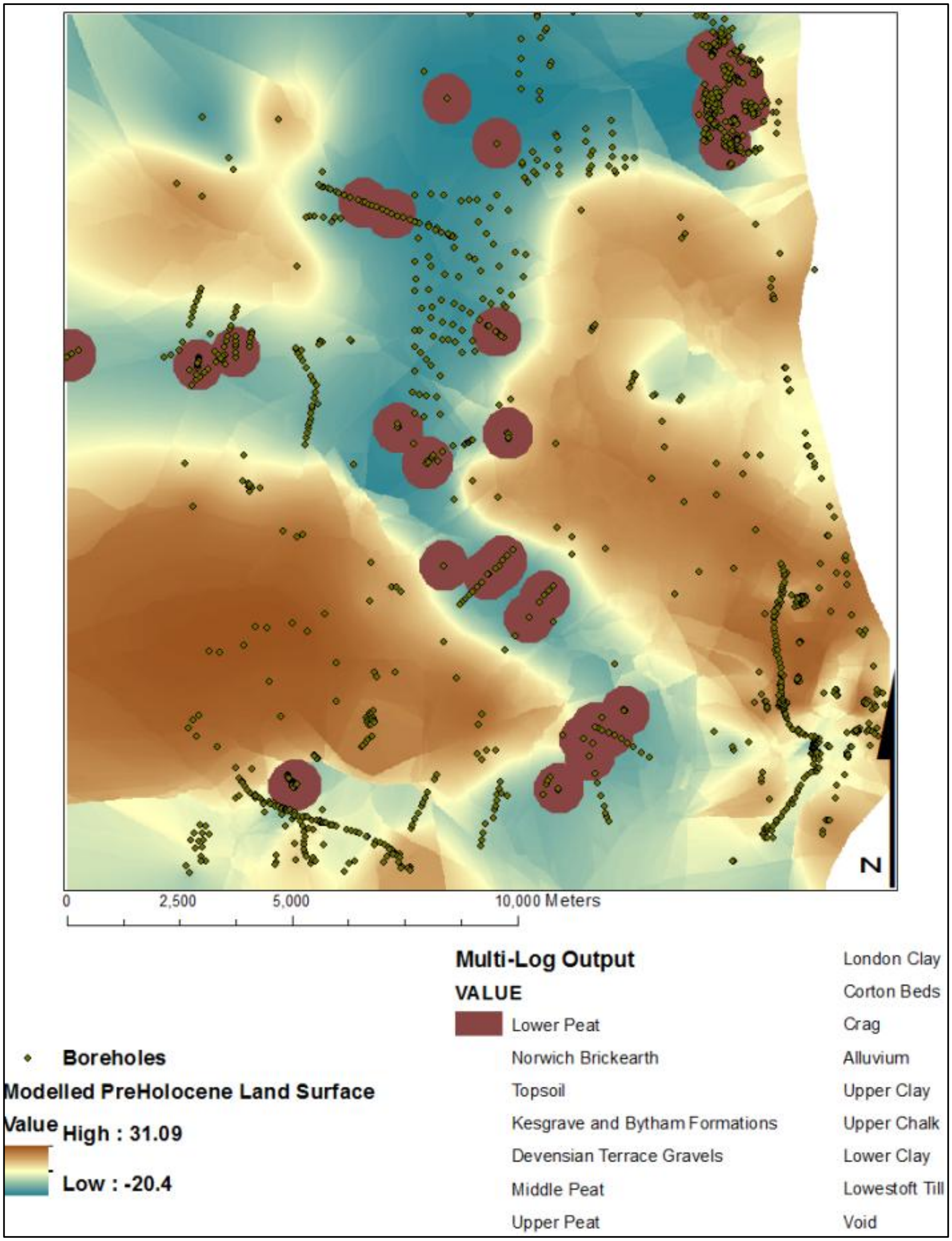


Figure 87. *Lower Peat multi-log output plotted with borehole locations against modelled pre-Holocene land surface*

Trees like that, when they fall the whole place feels different,
different air, different creatures entering the gap. I saw two roe
deer wandering through this morning. And then the wind's go its
foot in and singles out the weaklings, drawn up old coppice stems
that've got no branches to give them balance...
... They say all rivers were once fallen trees...

(Oswald 2002, 12)

Figure 88. Reeds lining the modern River Waveney.

The rising water table in this time period would have made the River Waveney a more dominant presence in this period than in the earliest part of the Holocene and would have impacted the daily and seasonal rhythms of life in the valley. The greater dominance of *Alnus* in the surrounding landscape would have provided an extra, very visible, element to the seasonal patterns experienced; where they would have been constant and evergreen before, trees would now have changed colour and shed leaves, becoming bare in the winter and budding again in the spring. This would have changed the visibility through the woodlands as well as the amount of light available. Even the smell of the forest would have changed as pine trees diminished and alders took their place. As Hockney (2012) describes, above, and Oswald (2002) alludes to, the structure of these trees would have framed the landscape very differently when bare as opposed to when in full leaf. Near the river, where Lower Peat was accumulating, the reeds and swamp ecology would have been much more prevalent, extending further away from the river rather than forming a narrow strip on the banks. The approach to the water would have now been impeded by *Phragmites* growing densely to waist height or higher. Woodland would no longer have directly opened onto the river. From the water, the height of the reed vegetation would have likely impeded the view of the woods, and would have isolated the river from its surroundings, allowing people only to see up and downstream instead of further across the landscape. The texture of the land underfoot along the river would have been wetter and swampier, the sands, gravels and clays of the earliest Holocene now being covered by the accumulating vegetation as it formed this first peat layer. Downstream, especially, where mollusc shells have been recorded in the Lower Peat formation, the water would have been increasingly saline, changing the species inhabiting the river and its surroundings, and changing access to fresh water for people living in this region.

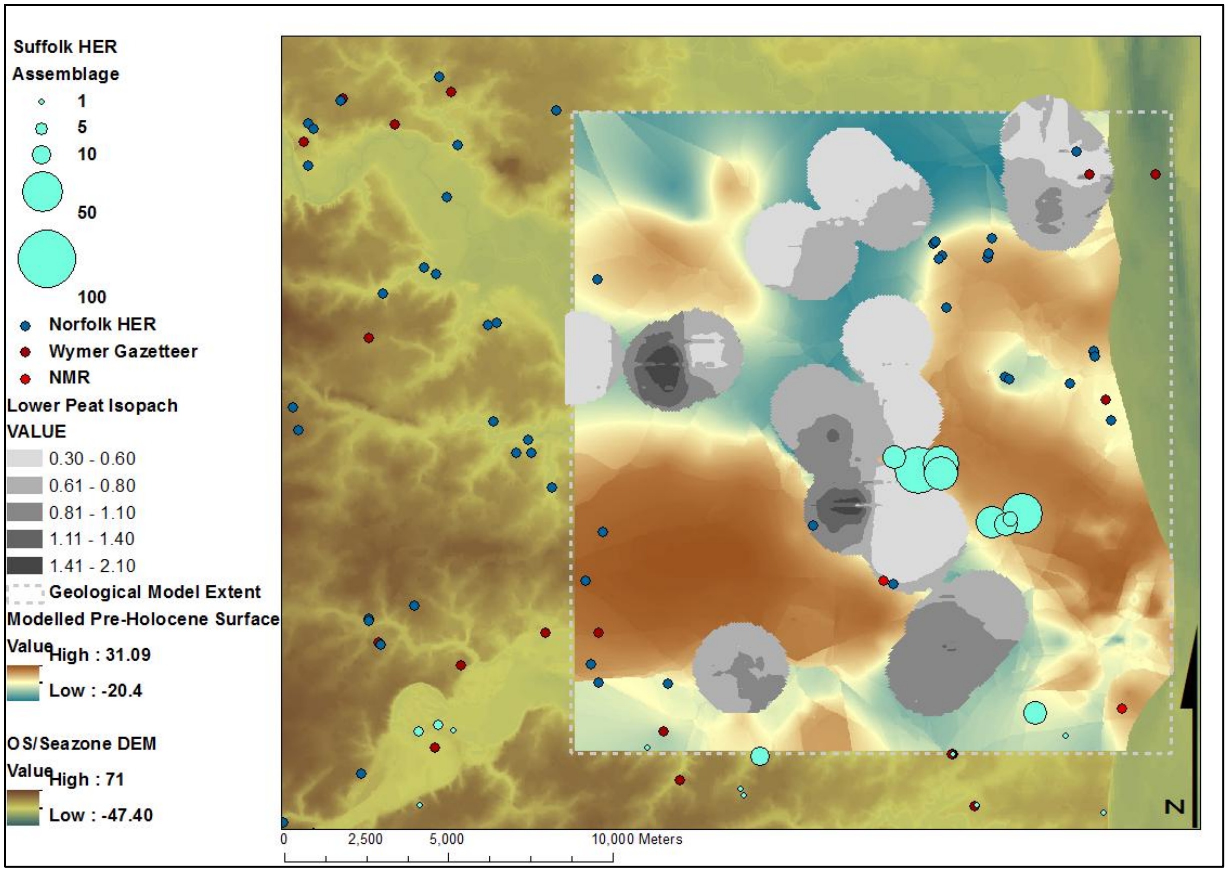


Figure 89. *Archaeological artefact finds plotted against modelled Lower Peat isopach on a background of the modelled pre-Holocene surface and modern DEM*

It is also interesting that the effect was not uniform across the landscape. While the Lower Peat layer formed inland and downstream concurrently, it did not form throughout the alluvial fan of the Waveney; notably, the environment at Fritton Decoy was largely unaffected. Therefore, moving along the river's path, only parts of the landscape would have been changing. Artefacts, as shown in the comparison of the Lower Peat isopach with the collated archaeological record, were deposited both in areas where Lower Peat was forming and where it was not. The diversity in these alterations to the landscape would have been perceived during the use and discard of these artefacts. Equally, parts of the Waveney landscape were changing at different rates. The greater accumulation in the middle of the river indicates that, once begun, this likely formed more quickly than at either end of the river system. A sense of lateral diversity in the environmental response of this landscape to the rising North Sea waters was beginning to form. This would have been a perceivable element of the landscape as individuals and groups moved through it. This would have added to the overall sense of diversity within this area; the environment was changing in terms of water quality, vegetation, animal species and seasonal patterns affecting both resource availability as well as the perception of the landscape in which people dwelled.

Lower Clay

As the North Sea continued to rise, the Waveney Valley began to change more dramatically; while Lower Peat formation began to alter the landscape in patches, the conditions leading to the deposition of Lower Clay altered the environmental texture throughout this study area. The Waveney valley has experienced two periods of marine inundation in the Holocene (Alderton 1983). The first led to the deposition of Lower Clay from 7650 to 5150BP, the thicker of the two clay deposits in the Breydon Formation, described by Alderton (1983) as being less laterally extensive than the later Upper Clay deposition. Lower Clay elevations are observed to rise steeply towards the coast (Alderton 1983 and Coles 1977). Coles (1977) notes a greater thickness, 12-14m, in the Yare than Alderton's (1983) >9m thicknesses seen in the Waveney. In both locations, however, Lower Clay is documented as showing a substantial thinning trend moving inland. In fact, Alderton (1983) leaves Lower Clay out of her Stanley Carr upstream archetypal sequence for the Upper Waveney valley. Tapering of Lower Clay is also described as occurring laterally towards the buried valley margins in the Waveney (Moorlock 2000).

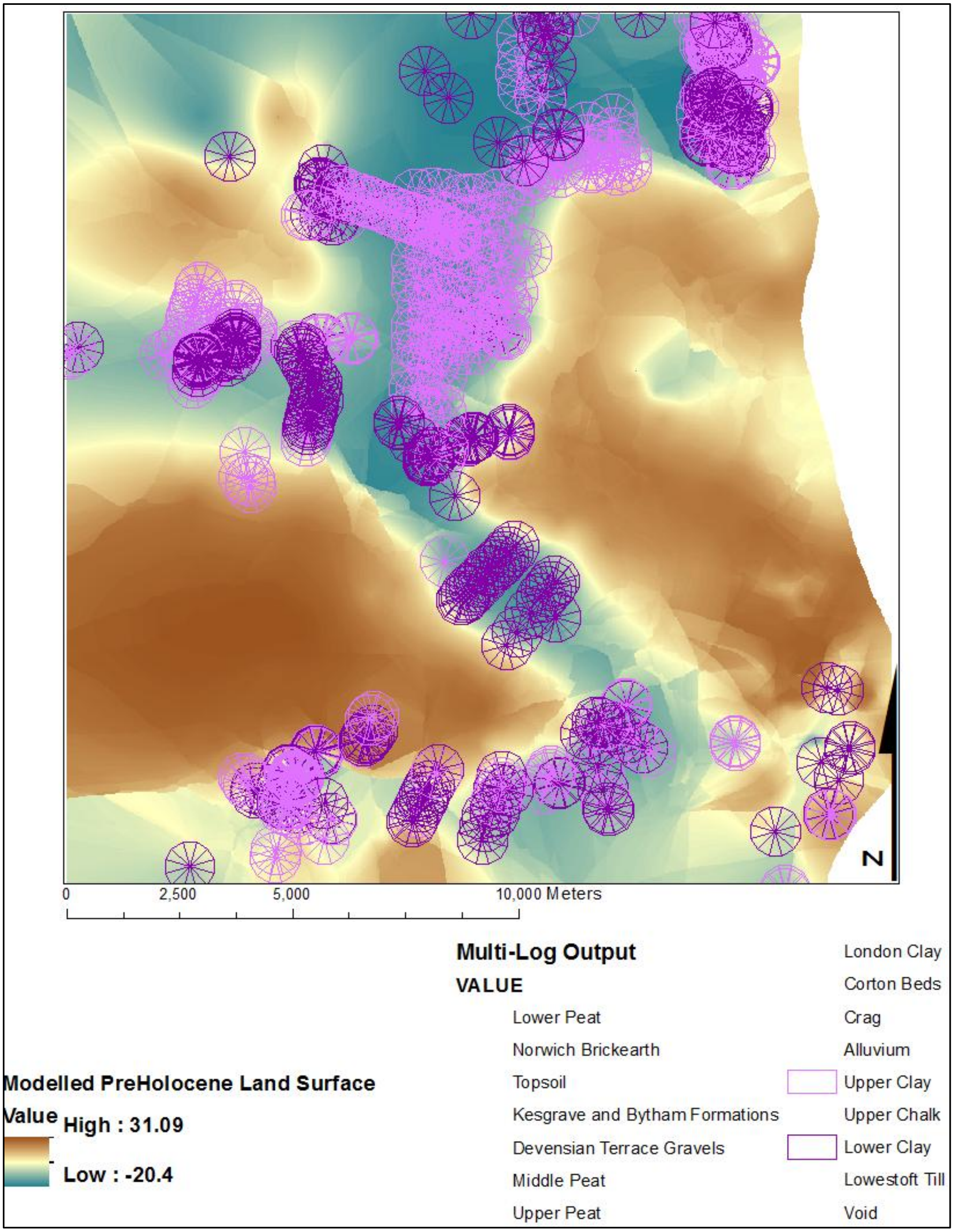


Figure 90. *Map comparing lateral extents of Upper and Lower Clay*

The results of the geological modelling, Figure 90, at first appear to confirm descriptions of the lower spatial coverage of Lower Clay as compared to the Upper Clay deposition of the second marine inundation. However, by investigating the depths of the boreholes where Upper Clay is recorded and Lower Clay is not, it becomes clear that these cores were most often stopped in the Middle Peat unit and, therefore, have not actually proven the absence of Lower Clay. The interpolated isopachs (Figure 94), which would mitigate the effect of shallower boreholes in the middle of a sequence by connecting between them, show a markedly similar spatial coverage in the Waveney, though Upper Clay does appear to exceed the bounds of Lower Clay in the Yare. The isopachs in Figure 91 do verify the greater thickness of Lower Clay which has a maximum of 13m as opposed to Upper Clay's maximum of 7.5m. Also contradicting Alderton's (1983) Stanley Carr typological sequence, both the isopachs and the borehole data shown in the Multi Log outputs demonstrate that Lower Clay is present in the upper Waveney valley despite upstream thinning. As seen in Figure 95, Alderton (1983) underestimated the lateral coverage of Lower Clay, leading to its elimination from the upstream sequence. Though only modelled as 1m thick at Stanley Carr, this unit is a key component of the upstream stratigraphic sequence. Lower Clay can clearly be seen to thin appreciably upstream through the Waveney valley. While both Upper and Lower Clay thicken seawards in the Yare, the gradient is much steeper in Lower Clay. Lower clay is of similar thickness in the upper Waveney and Yare valleys, with a slightly higher average thickness in the Yare, as indicated by the differences in Coles' (1977) and Alderton's (1983) reported thicknesses. Reflecting the slope of the underlying geology, a downstream trend can be seen in the reduction of Lower Clay thickness as the rivers approach Great Yarmouth and the North Sea. The sharper coastal-trending slope of the pre-Holocene land surface is softened and shallowed in the modern topography due to the coastal-trending thickness of both clay stratigraphic layer.

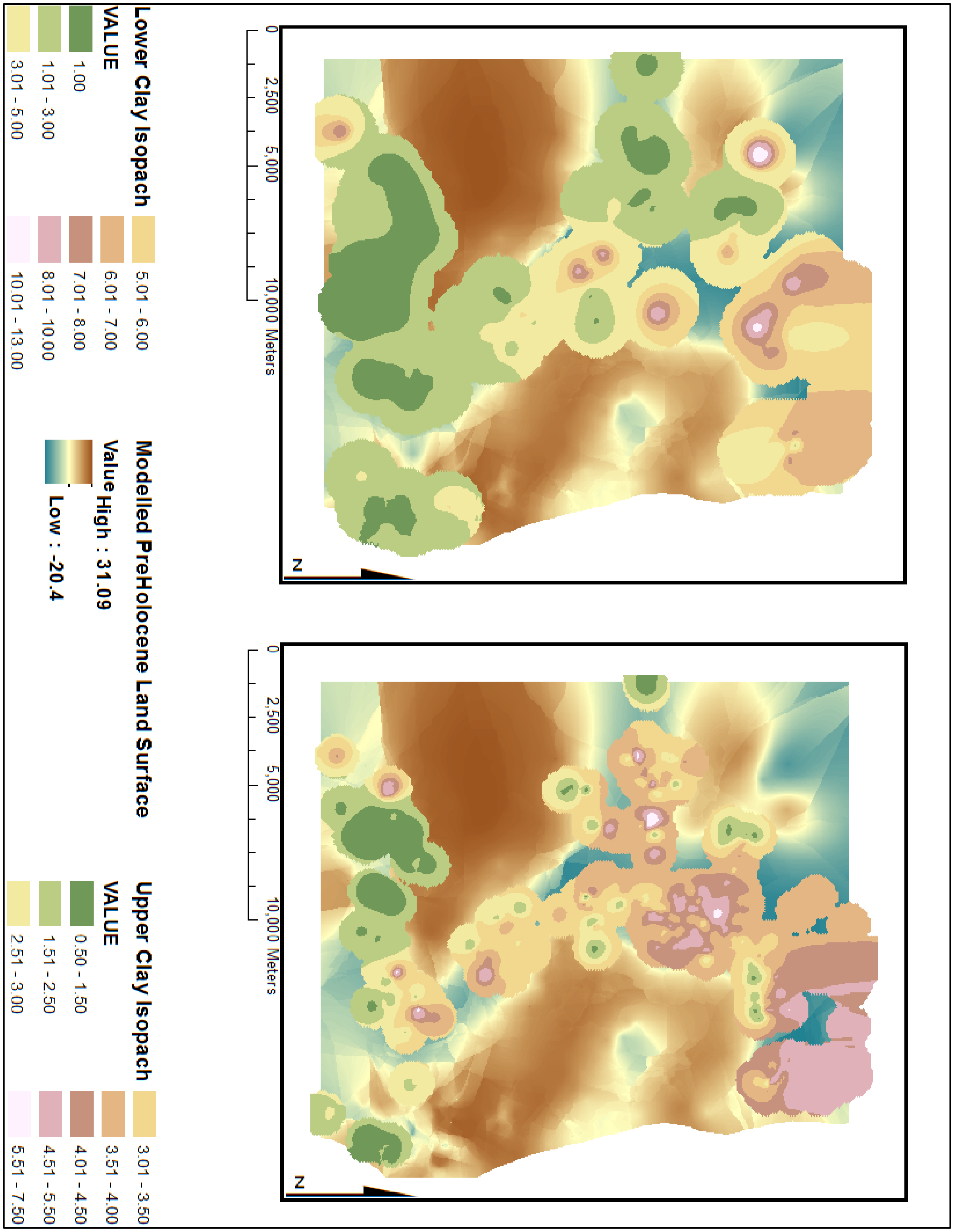


Figure 91. *Lower Clay v Upper Clay isopachs*

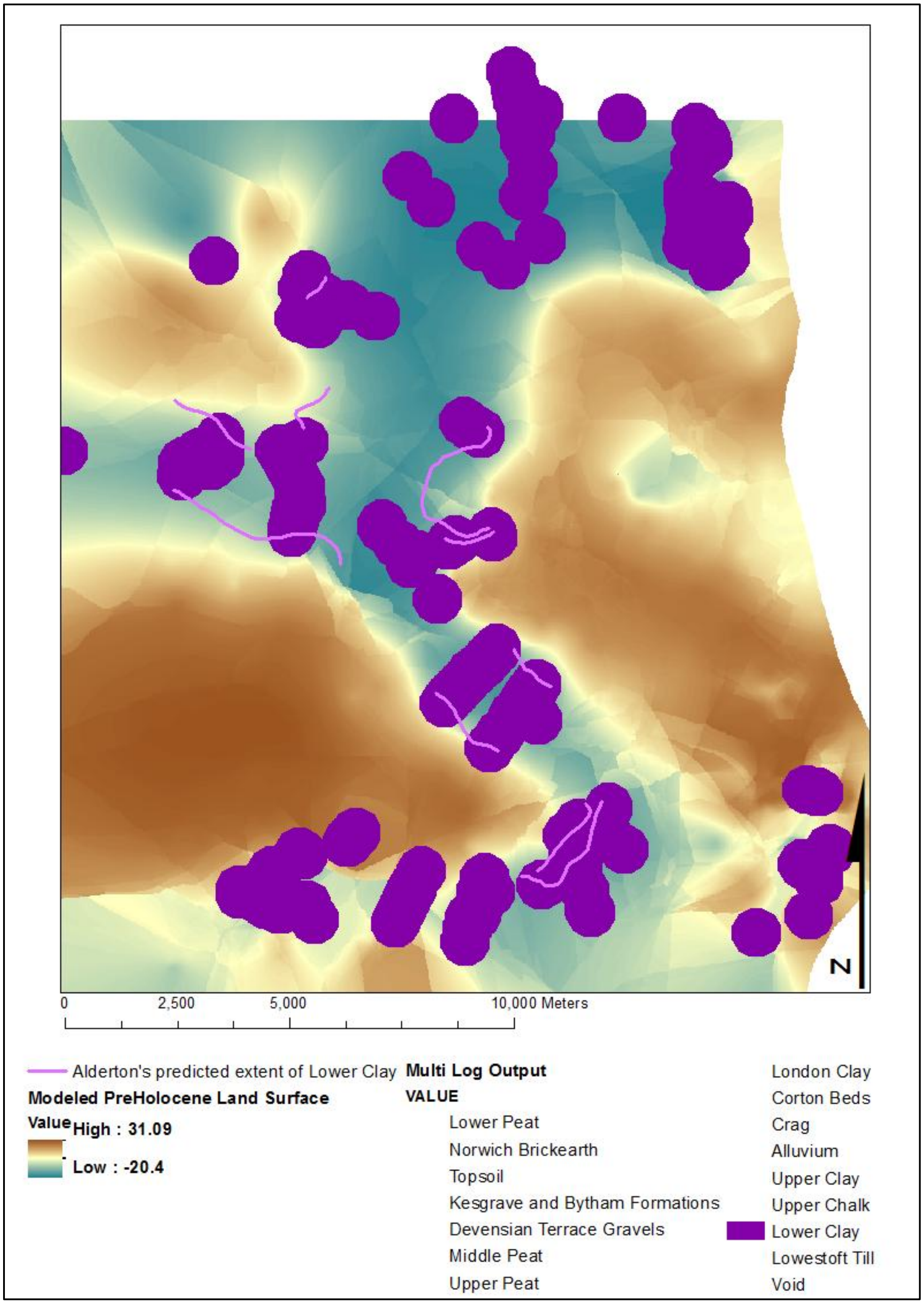


Figure 92. *Alderton's Predicted extent of Lower Clay compared with the multilog output generated according to methodology presented in Chapter 4 drawn against the modelled pre-Holocene landsurface*

The thickness and extent of the Lower Clay unit indicates that this layer signifies a major change to the study area landscape. Water had become a leading influence throughout the Waveney Valley, especially near the North Sea mouth, rather than in isolated areas as during the formation of Lower Peat. Shells, now present through the lower valley indicate the shift to marine conditions rather than the brackish, estuarine conditions preceding this time-step. The change from largely fresh water to marine conditions extending up to Boundary Dyke would have been noticeable in the taste of the water and air, in the feel of salt depositing on skin. New animals would have been drawn to these new conditions, so resources would have shifted as would have the appearance and feel of the landscape as these different species began to inhabit the environment. Downstream, where the waters were now tidal, a new daily rhythm would have become part of life introducing a sense of timing to the day derived from the river; the newly dominant water providing pacing to the landscape.

The shape of the landscape was also beginning to change with the deposition of this thick clay layer. Where lower valley used to be much steeper, it softened with the deposition of this layer; the slope of the banks downstream in the Waveney would have become gradually more similar to that in the upper valley. Moving up and down the river banks, the difference between shape of the river inland and downstream would have become subtler even while the other characteristics, salinity, tides, vegetation and fauna would have been diversifying. The archaeological record shows the deposition of artefacts all along the edge of this accumulating layer, indicating that people would have interacted with this new lithology as it formed. The largest artefact clusters are located in the mid-river valley where the clay is at an intermediate thickness, approximately 4m, and has an extensive spatial coverage.

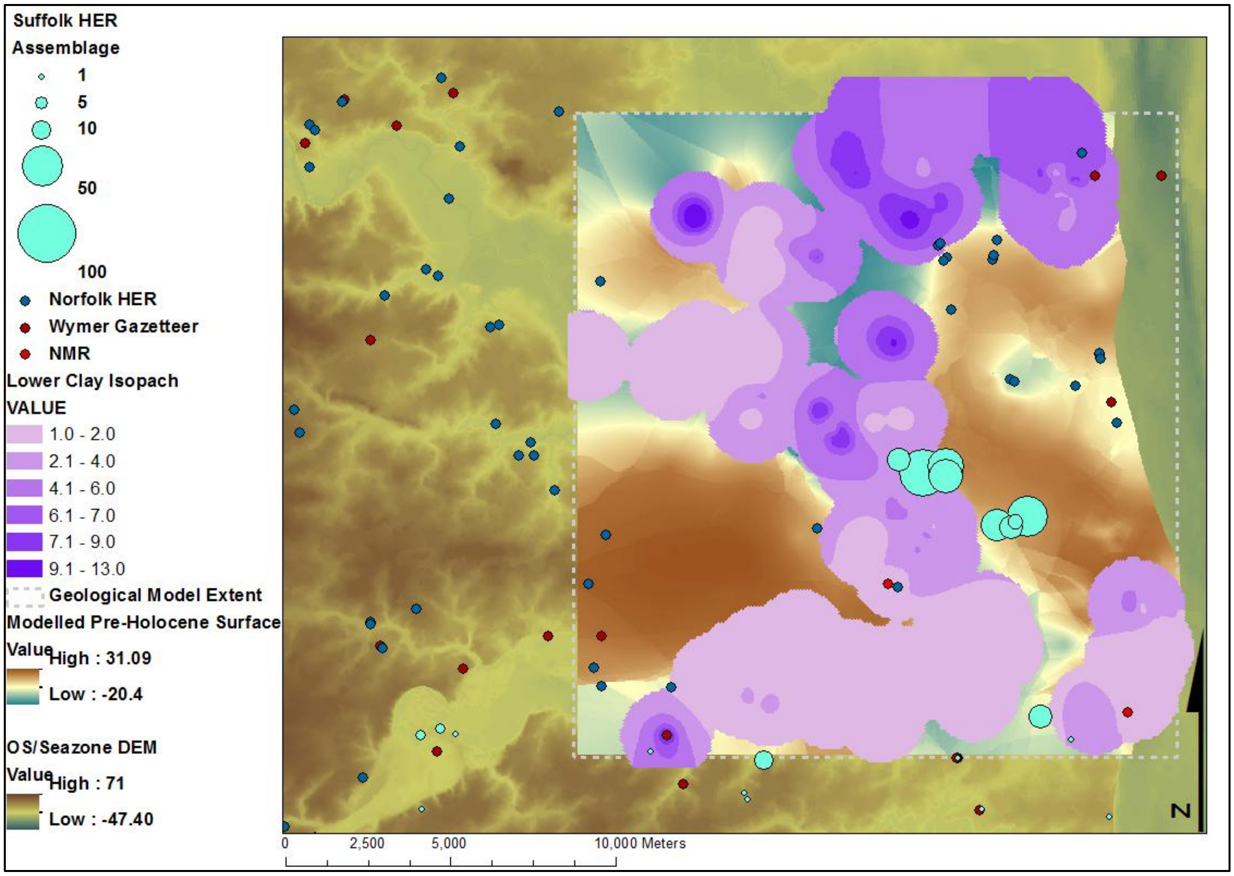


Figure 93. *Archaeological artefact finds against Lower Clay isopach with a background of the modelled pre-Holocene output and modern DEM*

Downstream in the Waveney valley, thin lenses of sand and shells are increasingly present in the lowest levels of this Breydon clay. The molluscs present at the base of these coastal cores reinforce the picture of forming tidal flats. The abundance of molluscs, forams, diatoms and higher algae at Caldecott Hall shows periodic high energy conditions were achieved at least this far upstream. Most species recorded at Haddisoce Bridge and Caldecott Hall suggest strongly brackish conditions in this region (Coles 1977). Moving further upstream to Boundary Dyke, assemblages show that this stretch of the Waveney was remote from tidal influence. At the inland limits of Lower Clay, in situ *Phragmites* growth, present further downstream by the end of Lower Clay accumulation, indicates salt marsh vegetation growth (Alderton 1983). Fritton Decoy, while still sheltered from the strongest tidal currents seen at Caldecott Hall during the initial increase of marine influence, was rapidly subsumed by Lower Clay formation; unlike the surrounding landscape, this area did not shift during the formation of the Lower Peat layer, so change to estuarine conditions here occurred much more suddenly. The previous expansion of *Alnus*, a signature of Lower Peat formation, was suppressed due to the increase in heavy, clayey soils resultant from the higher water table. These conditions, however, were ideal for the expansion of *Quercus* (oak) and *Corylus* (hazel) (Chinery 1987) which maintained regional importance throughout the Waveney valley during the formation of Lower Clay (Alderton 1983). Further, *Tilia* (lime) species, preferring chalky, moist soils (Chinery 1987), underwent a large population development, likely most dominant in the west of the study area where Upper Chalk was still present at the surface of sediments beyond the alluvial fan.

Figure 94. Deciduous trees along modern River Waveney.

With the expansion of oak trees, the seasonal changing of colours would have been a strong component of the yearly cycle down, opposing the green-coloured stasis of the start of the Mesolithic. Even the acorns from Oak and Hazel, small and smooth as compared to the large, spiky pine cones of the earlier pine trees, would have changed the perceived texture of this landscape, providing a different feel and appearance on the ground as well as the proverbial food source of the Mesolithic. Lime trees, making their first appearance in the landscape would, too, have provided new colours, smells and flavours to the environment, adding to the substantially different overall texture of the landscape as encountered by Mesolithic people in the course of their day to day actions.

Middle peat

I stood here, I saw a whole flock of water migrating...
going out again with empty casks,
bags of trickling particles, bones, salts
(Oswald 2002, 46)

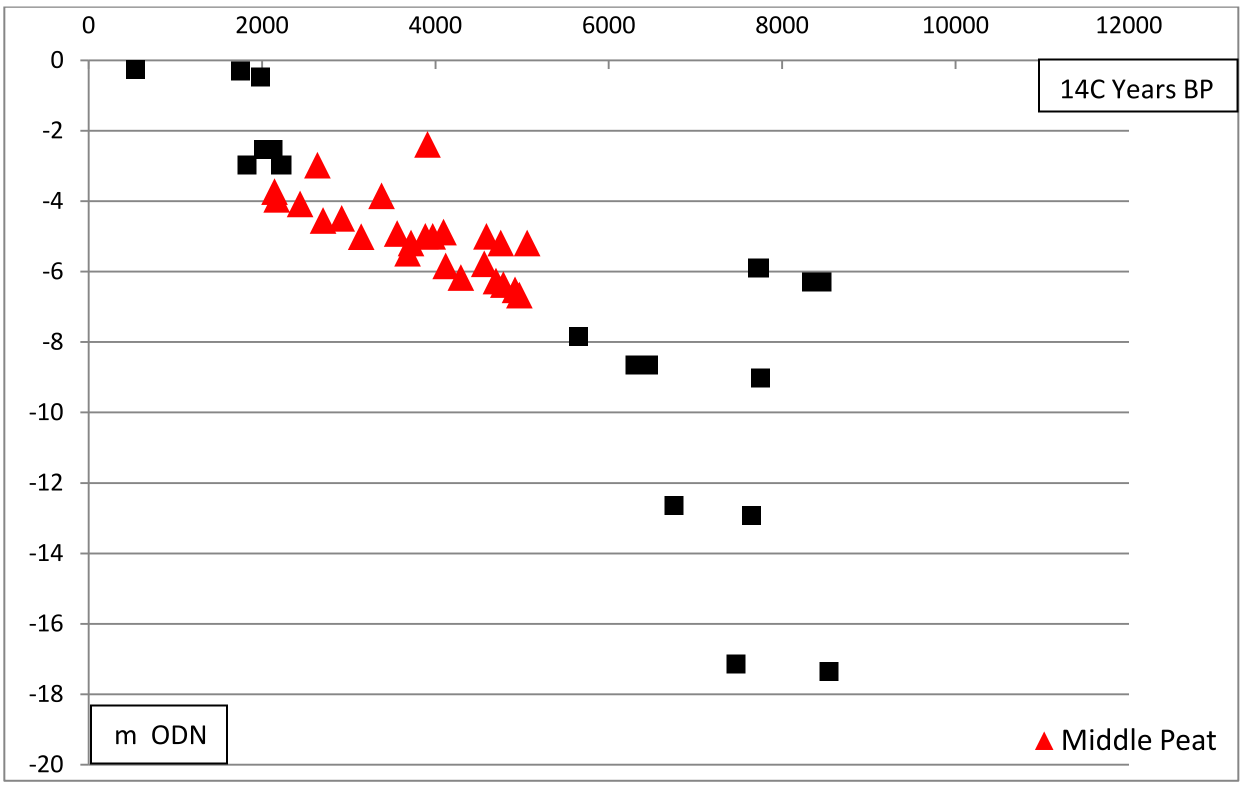


Figure 95. *Age-Depth graph showing dated samples collected from Middle Peat material. Dated samples from Alderton (1983); 14C dates BP derived from organic material.*

As the tidal conditions of Lower Clay deteriorated, and water retreated, lessening, though certainly not eradicating, the influence of water on the Waveney Valley by the end of the Mesolithic period. Though no longer marine, the landscape of the study area at this time was still tied in to the river where peat was now forming again. Middle Peat is the most extensive of the three Breydon peat layers, spanning the full width of both the Yare and Waveney valleys. Alderton (1983) describes the progressive replacement of the inland-thinning Lower Clay layer by Middle Peat. Coles (1977) notes a 1-4m thickness of this peat, with coastally increasing erosion and thinning due to compression by the overlying Upper Clay layer.

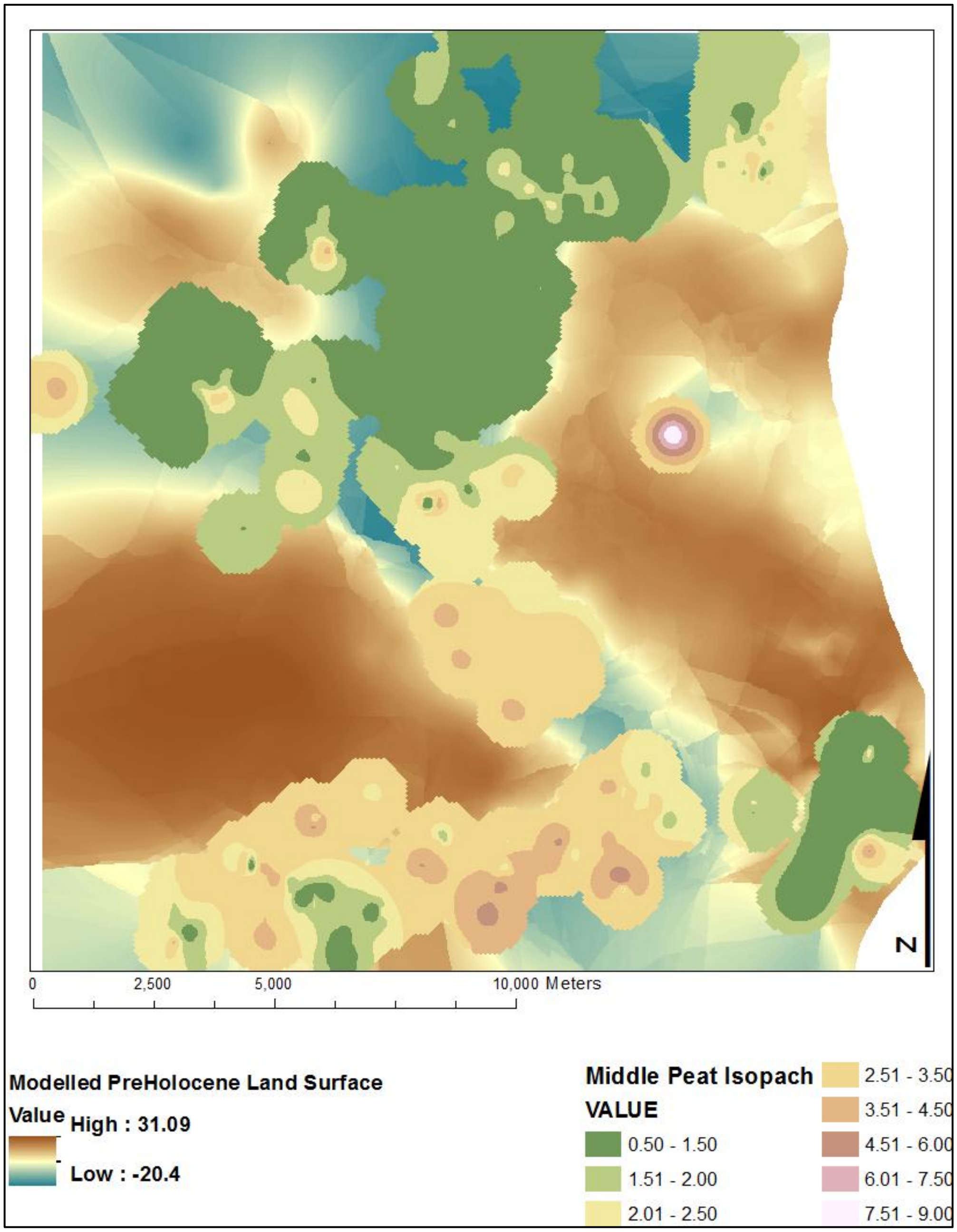


Figure 96. *Middle Peat isopach displayed against modelled pre-Holocene surface*

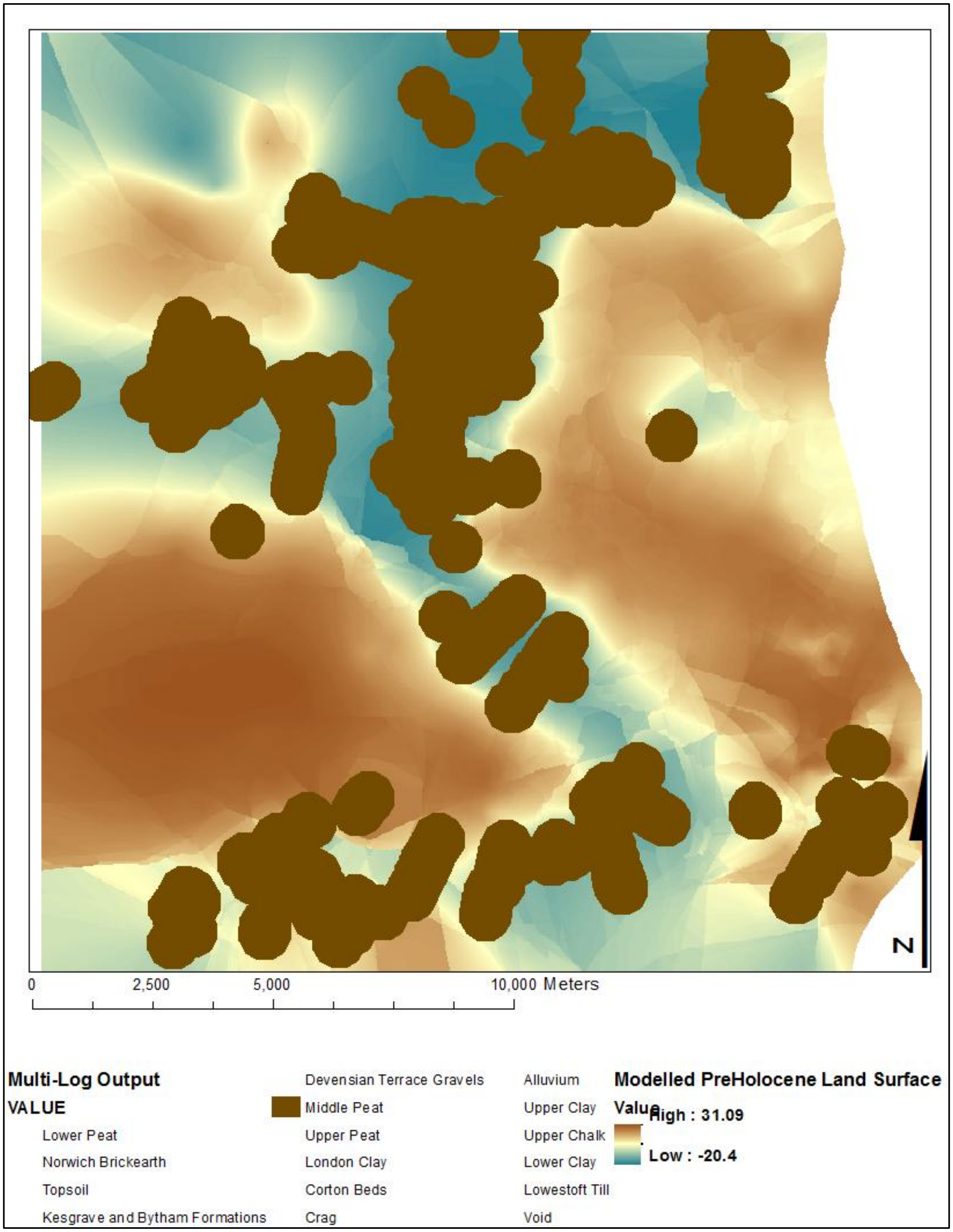


Figure 97. *Middle Peat multi log output against modelled pre-Holocene surface*

The difference in spatial coverage of Middle Peat is clearly seen from both the isopach and the Multi Log output, with this unit found throughout the length and width of both the Yare and Waveney valleys. The coastal thinning noted by both Alderton and Coles can also be seen to be inversely proportional to the thickening of Upper Clay, likely due to increased compression under the weight of this dense clay layer. The maximum thickness of Middle Peat modelled in the isopach is, however, 9m; much higher than the maximum 4m described by Coles. Indeed, there is a marked visible southern-thickening trend, with the vertical extent in the Waveney often more than double the maximum evidenced in the Yare. This may be due to a combination of the higher topography in the north of this study region and the greater thickness of Upper Clay seen in the Yare valley. The higher topography would have slowed peat formation in comparison with the lower Waveney valley and the thicker Upper Clay would have further compressed Middle Peat in the Yare.

It's dawn, it's a huge sphagnum kind of wilderness, and an hour
in the morning its worth three in the evening. You can hear
plovers whistling, your feet sink right in, it's like walking on the
bottom of a lake.
(Oswald 2002, 2)

Figure 98. *River Waveney seen through reeds and grasses at Beccles.*

No longer hampered by an estuarine environment, *Alnus* flourished in the higher landscape of the Waveney valley (Alderton 1983). As the marine conditions abated and groundwater level fell, the well-drained conditions required by these trees would have returned to the study area. Therefore, this taxon is at the bottom of the wood peat sequence of Middle Peat. *Quercus*, despite the decline in the water table continued to flourish and can be seen in high fractions in the pollen record from the Somerleyton Marsh cores (Alderton 1983). In localized valley floor depressions, however, and the incised channel where water levels remained heightened, *Phragmites* fen, begun downstream at the end of Lower Clay accumulation, continued to develop at the base of the new peat layer. At Castle Marsh, just upstream from the Boundary Dyke cores, there is evidence of a thin bryophyte peat, indicative of a moist environment, increasing downstream to Share Marsh at the opposite side of Boundary Dyke, where a maximum thicknesses and species diversity was attained. Here, *Sphagnum* peat, growing in boggy areas, was also present. Despite retreating North Sea waters and the mid-to-upstream location of these cores, this mosaic of vegetational communities must have existed with areas of very wet fen and standing water. This likely continued localised ponding independent of the oscillating regional sea-level and similar to the conditions under which Lower Peat was formed. The lowest levels of Middle Peat formed in these wetter regions later progress from salt marsh and reed swamp into an *Alnus-Salix* carr similar to the bottom layers of this peat unit in the rest of the Waveney landscape. As Middle Peat formation came to its close, the mid-river profile sites Somerleyton Marsh, at Fritton Decoy and at Boundary Dyke showed evidence of an increasing water table and succession through sedge fen, to *Phragmites* reed swamp and salt marsh as estuarine incursion again approached before 3200BP. The sequestered environment at Fritton Decoy, now more exposed in the lead up to the second estuarine inundation, demonstrates the very wet conditions leading to *Sphagnum, Calluna, Betula* and *Hypnoid* mosses. Further downstream and more readily influenced by North Sea rise, the *Alnus* carr at Caldecott Hall had already given way to raised bog conditions by 4000BP, showing the earlier influence of resuming estuarine conditions than at Somerleyton Marsh and Boundary Dyke.

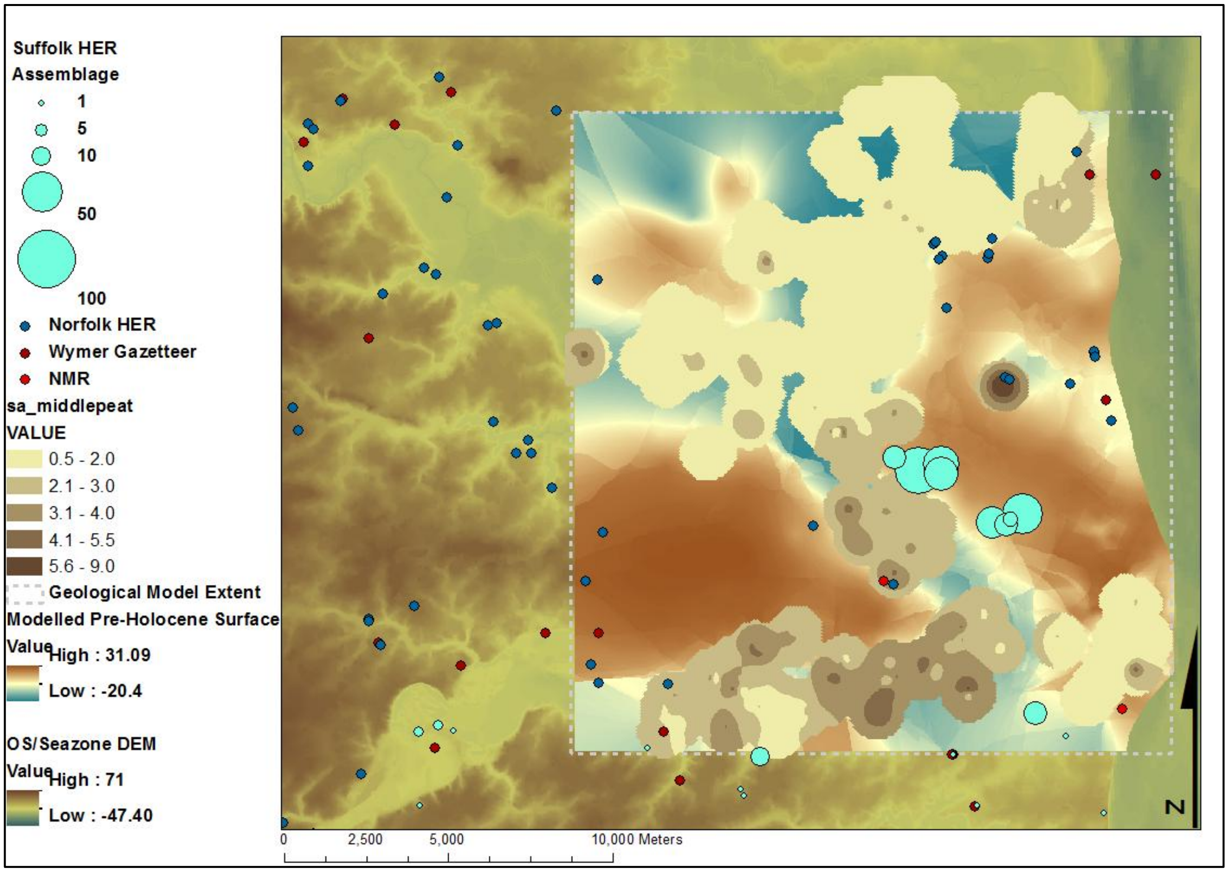


Figure 99. *Archaeological artefact finds displayed against Middle Peat isopach with a background of modelled pre-Holocene output and modern DEM*

The environment in the late Mesolithic, then, was dominated, once again by patchy, marshy species, by reeds and *Phragmites* once more, though this time more widely spread through the landscape. Artefacts were deposited throughout the margins of the growing peat layer, with the largest scatters found where Middle Peat ranges from 2-4m. The view from land would now have become very different from that on water. Rather than walking through forests along water edge, on ground with trees above as in the early Holocene, people would have waded through reeds to get to water, these at waist height and higher. In places it may have been possible to see over them when standing amongst them, but not through them. The river would have been isolated from the surrounding landscape by this vegetation. Walking along the river in this landscape would have differed from the first experience of forest bordering the river, from the isolated pockets of early peat formation and from the estuarine environment which deposited clay through the landscape. Swamp vegetation would have been much more prevalent and mosses, soft and damp underfoot, would have altered the texture with which people interacted as they dwelled within this area. The boundary between river and land would have been indistinct, one drifting into the next through the wide borders of reeds. The more dominant peat expanse would have changed the smell of the landscape again, from the early pine forests and following salt air, to the particular organic smell of peat. In the surrounding dry land, *Alnus* had moved back down toward river, to mix with *Quercus* these two species creating different shapes providing different structures to the landscape, both looking through them and looking up to the sky, across the landscape, or from a reed bed towards them. While the seasonal patterns of deciduous vegetation would have continued on from the Lower Clay phase, the tidal rhythms would have retreated back to the very downstream extent of the valley at the North Sea mouth. This daily swell would have faded, altering the experience of the periodicity in the landscape.

Upper Clay

Upper Clay deposition began after the close of the Mesolithic period and the transition into the Neolithic in region V. However, while not a direct component of considering the Mesolithic period, this unit of the Breydon formation, and the later Upper Peat unit will still be considered briefly due to their effects on the lower layers, formed during the Mesolithic period, and on the modern landscape, the context in which we currently consider the Waveney valley.

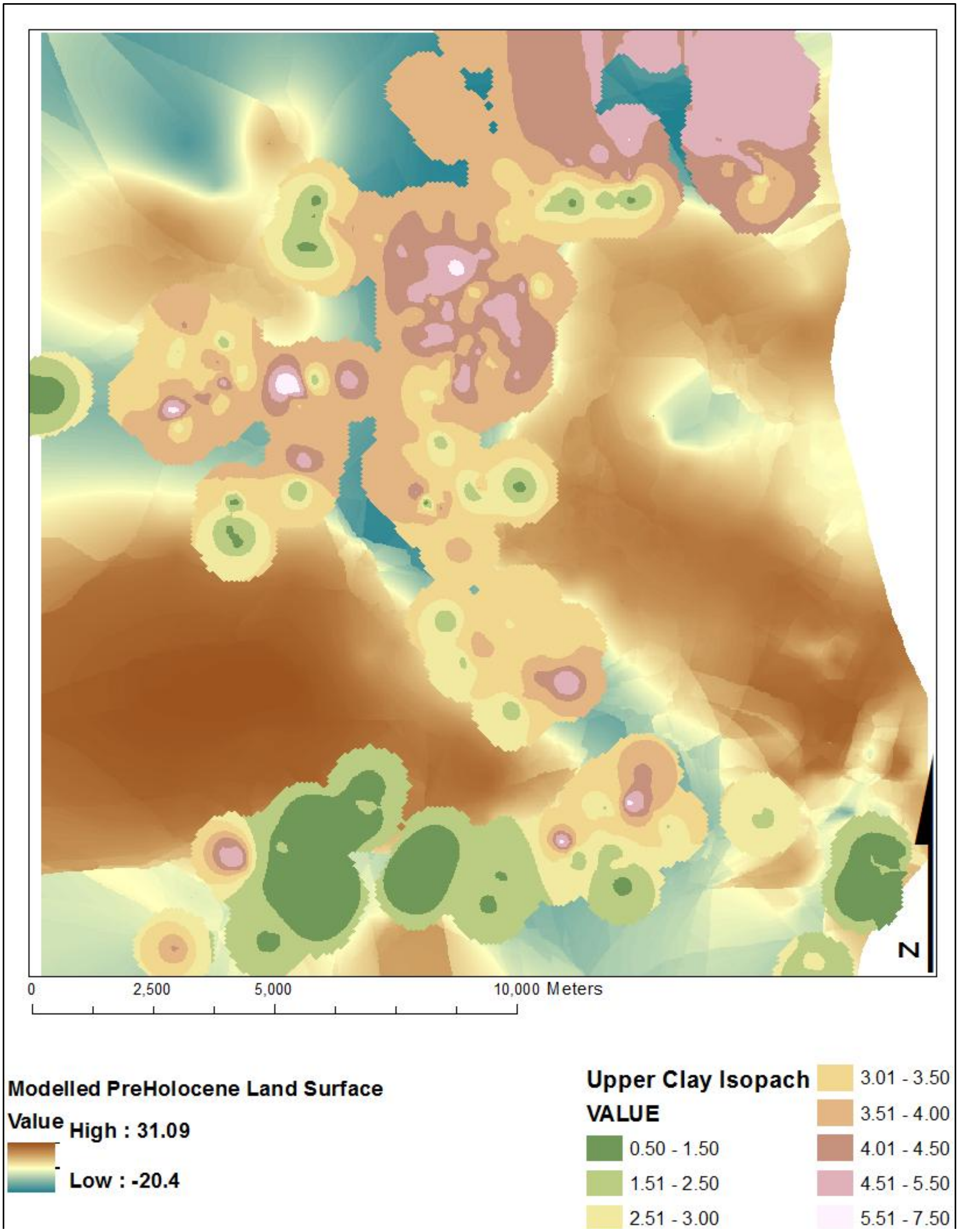


Figure 100. *Upper Clay isopach layered against modelled pre-Holocene topography*

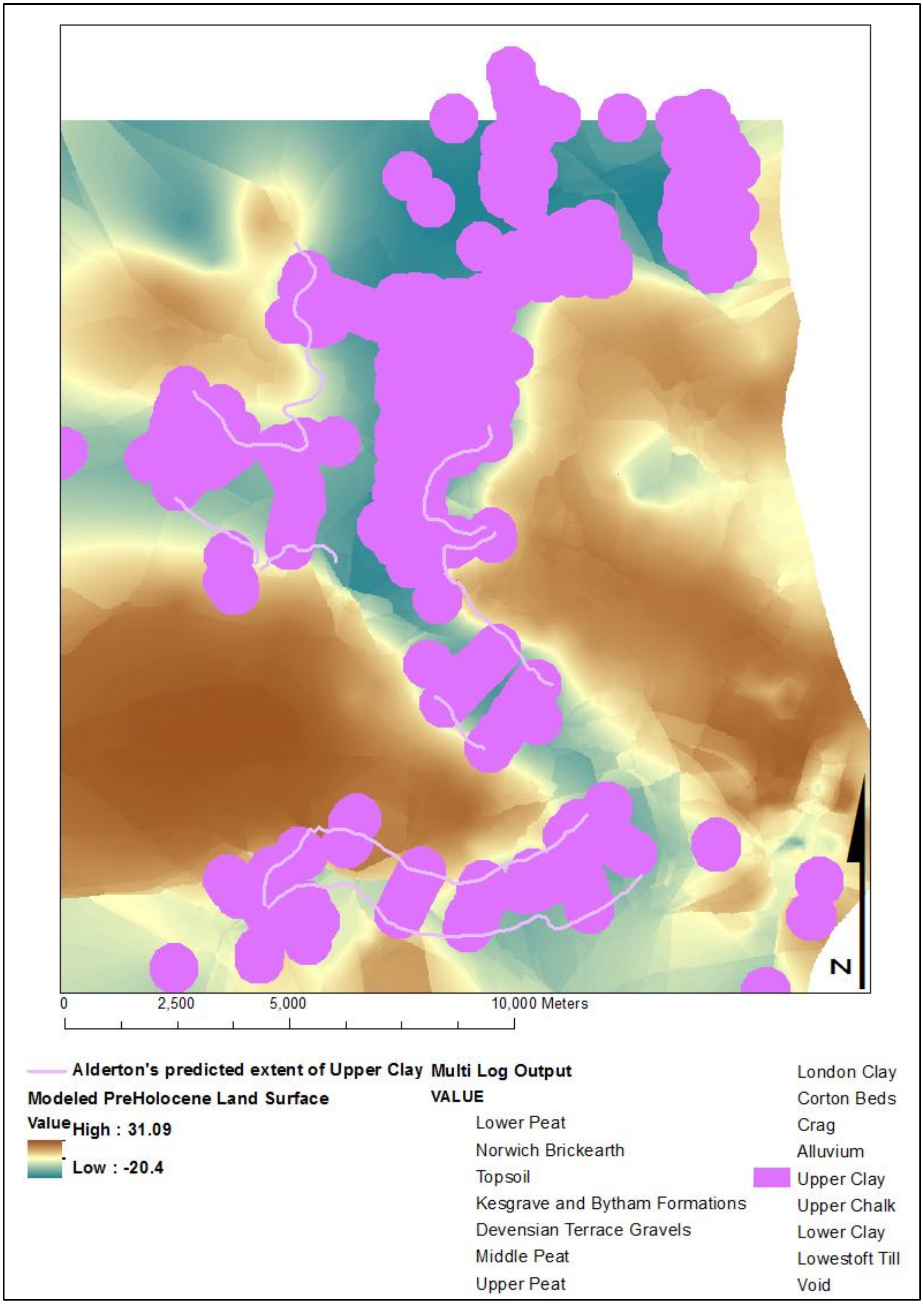


Figure 101. *Comparison of Alderton's (1983) predicted extent of Upper Clay with the modelled extent created from the full complement of borehole samples*

As demonstrated above, the stratigraphic modelling of the Waveney landscape shows that Upper Clay covers a similar lateral extent to Lower Clay in the Waveney valley, though exceeds this coverage in the Yare valley. In the upper Waveney valley, this unit appears to become more laterally constrained. Upper Clay thickens eastward to a maximum of 8m according to Alderton (1983) and Coles (1977) which is similar to the maximum thickness of 7.5m indicated by the isopach. This modelled output indicates a thickening progression downstream towards Great Yarmouth with highest average thicknesses in the Yare valley and a sharp increase seen in the Waveney valley as it flows towards Breydon Waters. This increased thickness in the Yare and towards Great Yarmouth has bearing on the weight of this dense clay unit pressing down on the looser underlying peat layers which increases towards the coast, contributing to the coastal-trending erosion and thinning of Middle Peat and likely further compressing the remaining pockets of Lower Peat. The slope of this layer is also important in accounting for the difference in the river profile slope of the modern DEM as compared to the modelled pre-Holocene surface (Figure 102). The near eight metre gain from the inland extent of the study area to the coast accounts for a large percentage of this levelling.

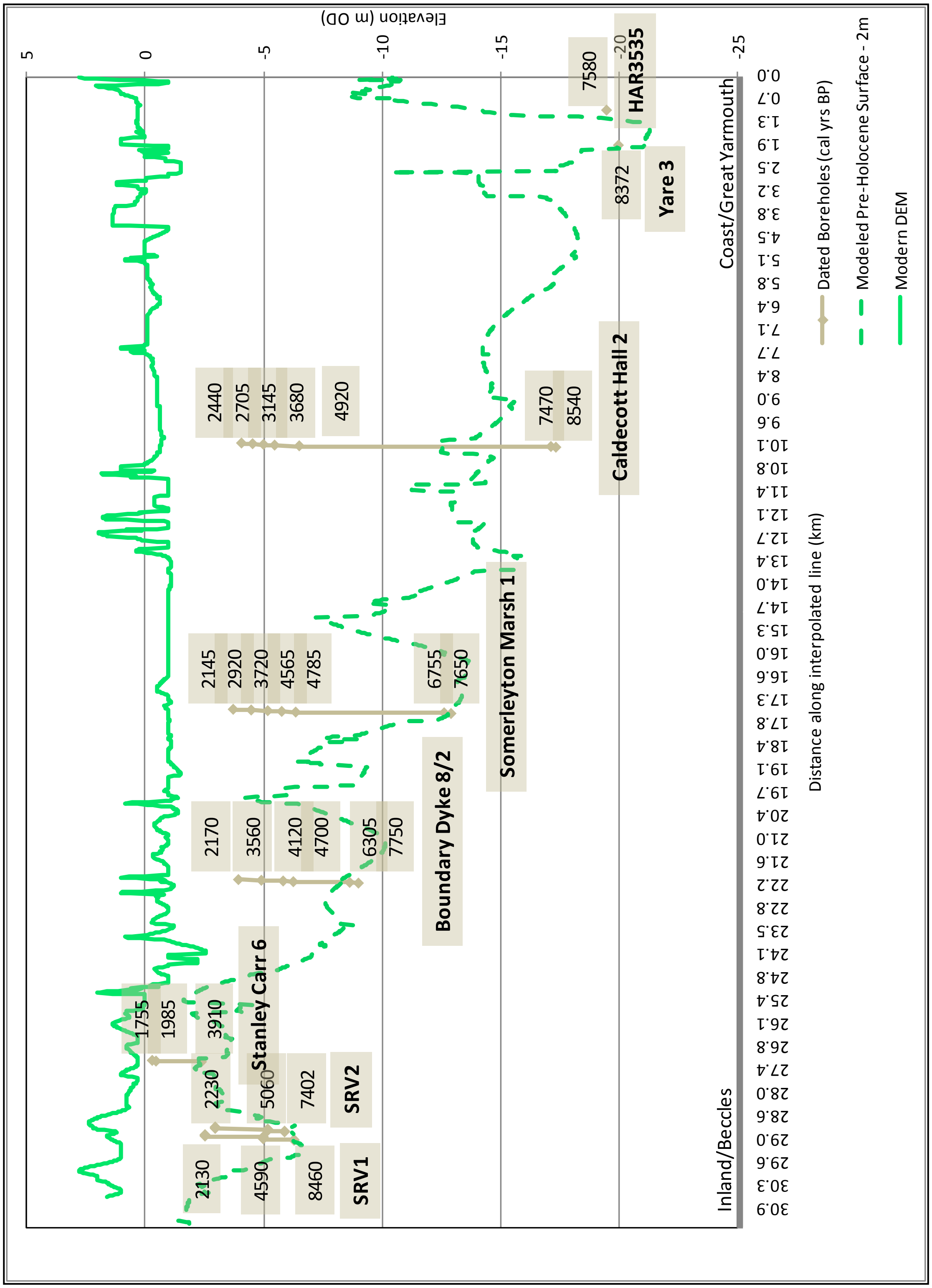


Figure 102. *Graph displaying dated boreholes against pre-Holocene slope of Waveney valley as modelled according to methodology described in Chapter 4. Dated samples from Alderton (1983); 14C dates BP derived from organic material.*

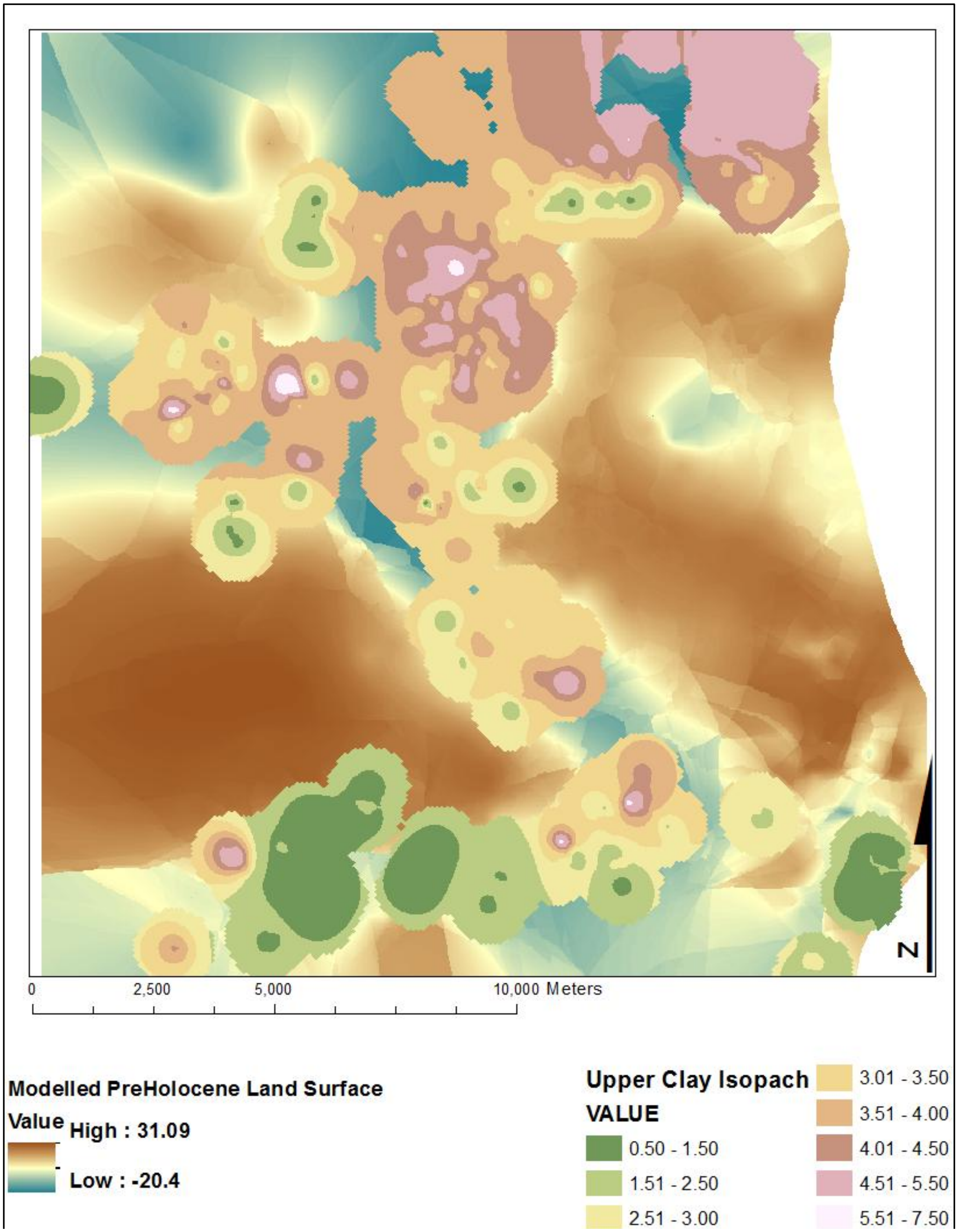


Figure 103. *Upper Clay isopach layered against modelled pre-Holocene topography*

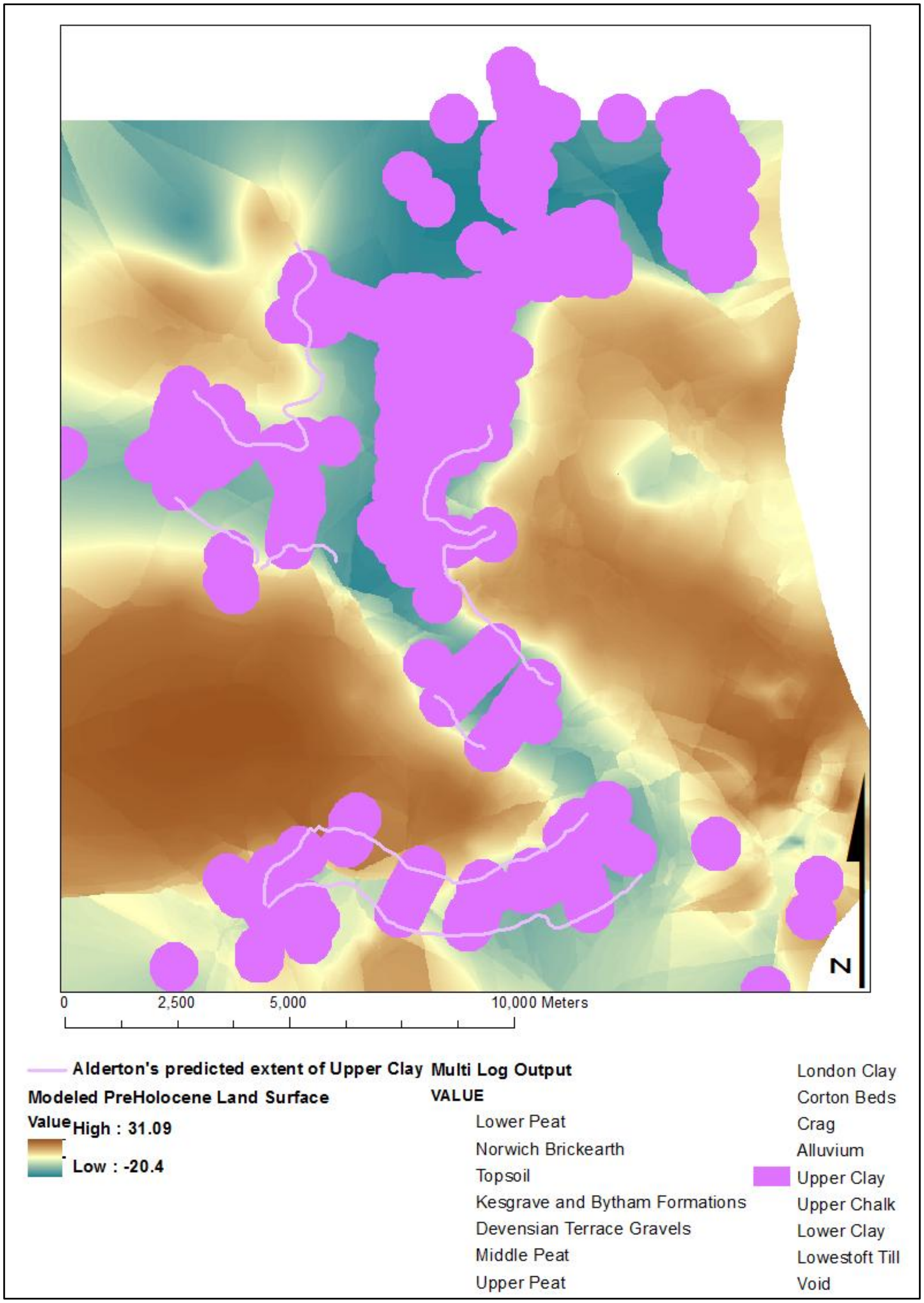


Figure 104. *Comparison of Alderton's (1983) predicted extent of Upper Clay with the modelled extent created from the full complement of borehole samples*

Upper Clay was formed as peat growth once more gave way to marine dominated mudflats and tidal channels. Comprising silty clays and clays, Upper Clay particle size fines away from the main tidal channel; indicating the strength of the tidal current in this main channel. At Great Yarmouth there is considerable variation with a mosaic of laminated sandy silts and organic silts. Similar to Lower Clay, these sediments show upwards fining. Tidal mudflats occurred widely over the area as far inland as Boundary Dyke and the Fritton Valley. Fritton Decoy, while not as isolated as during Lower Peat formation, still did not experience tidal conditions, but evidences the formation of middle to high salt marsh. Coarser sediments at Caldecott Hall and Halvergate Marshes show the direct marine connection. High salinity conditions in this downstream stretch of the Waveney were followed by increasingly brackish conditions as the tidal influence once more was reduced, as evidenced through the continued deposition of foraminifera and diatoms. Upper Clay was increasingly penetrated by *Phragmites* throughout the Waveney landscape. Pollen records show the large scale reduction of regional forests throughout the duration of the estuarine conditions of Upper Clay accumulation; herb taxa increased in number and importance throughout the dry-land context of the study area.

Upper Peat

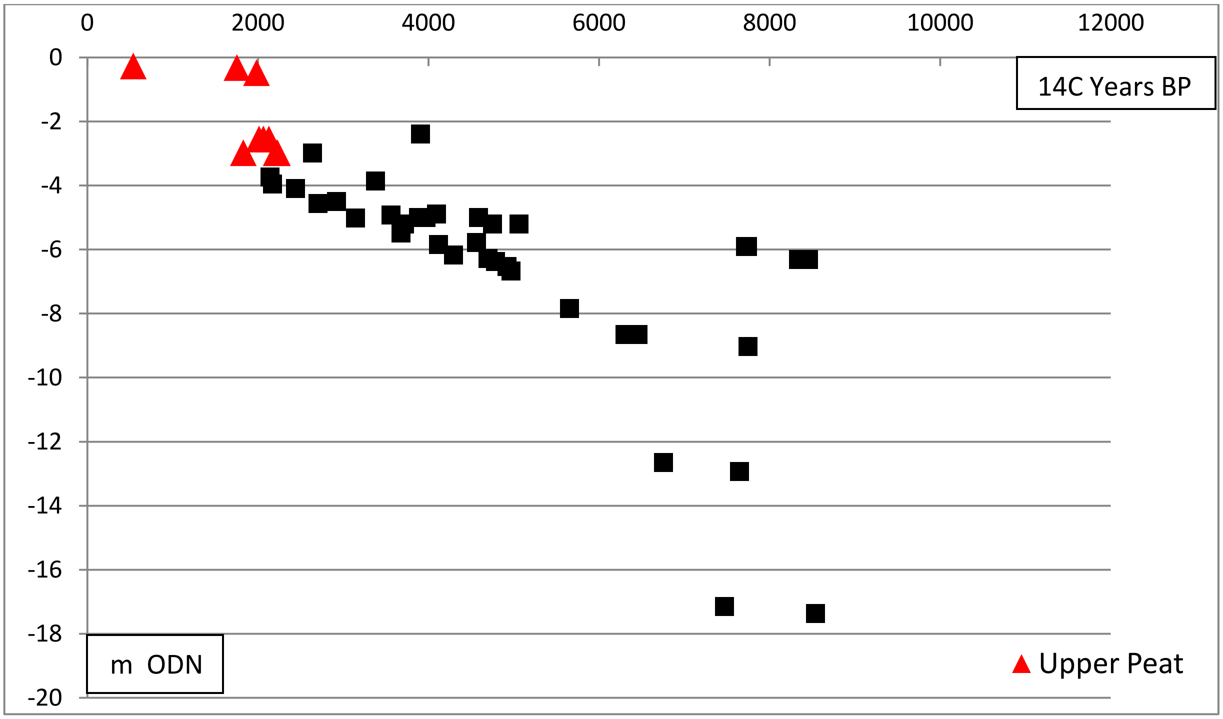


Figure 105. *Age-depth graph showing dates from Upper Peat material. Dated samples from Alderton (1983); 14C dates BP derived from organic material.*

Upper Peat caps off the Holocene sequence and brings us to the modern land surface in the Waveney study area. This unit is depicted as being discontinuous, deteriorating to outcrops in the upper Waveney valley. In the Yare, Coles (1977) portrays this layer increasing in the upper valley where Upper Clay thins, causing less compression. Alderton (1983) excludes Upper Peat from her downstream stratigraphic sequence; a difference from Coles' (1977) descriptions explained by the Multi Log output. Upper Peat thins significantly from Beccles downstream and is not present again until the Waveney joins the Yare before flowing into the North Sea. At this join it is a thin layer, ~40cm and appears to have been discounted in Alderton's furthest downstream cores as a component of Topsoil which is the same thickness from the surface in this region. The BGS boreholes often interpret Upper Peat in this stretch of the Waveney and Yare, which correlates with Coles (1977) descriptions from the Yare.

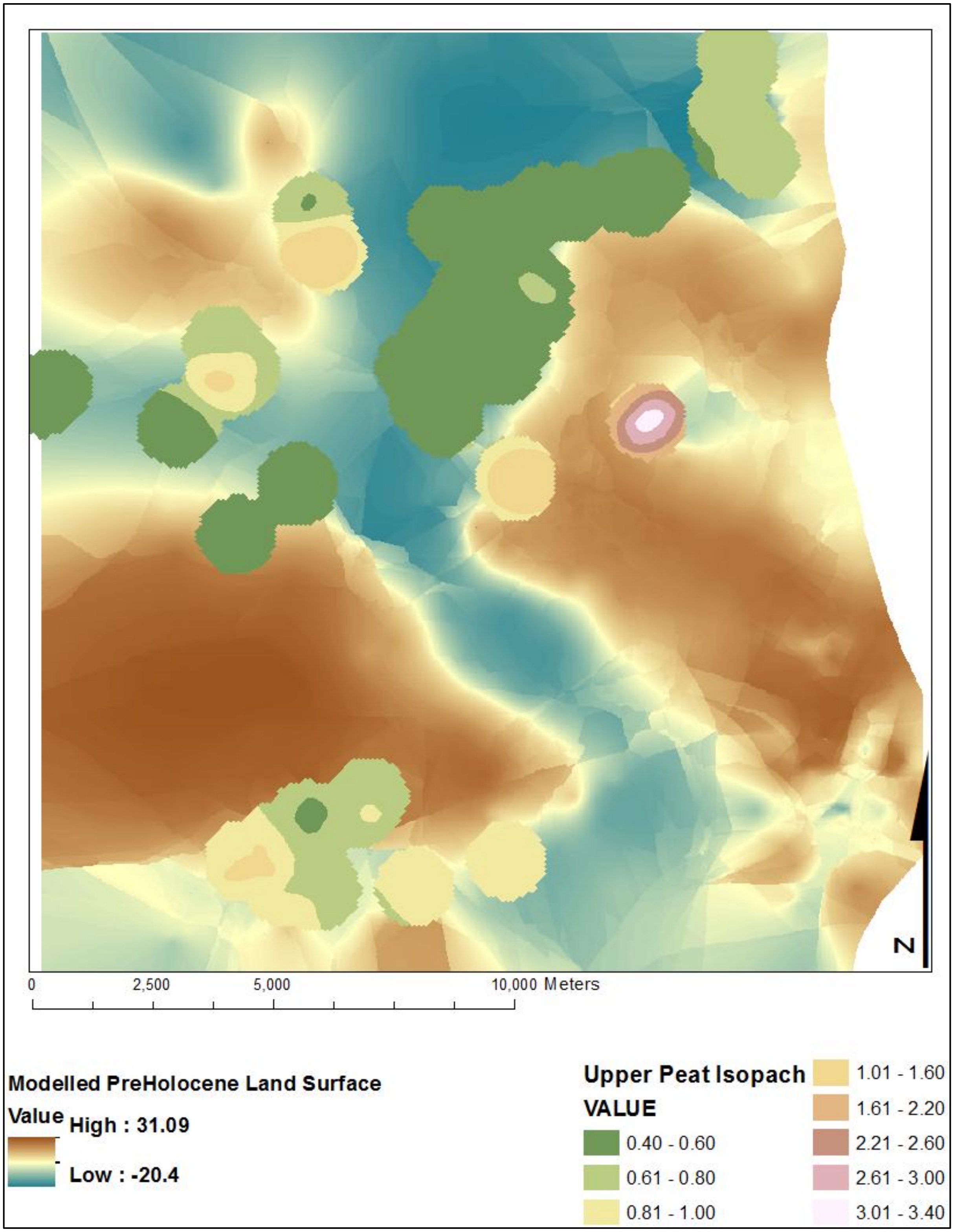


Figure 106. *Upper Peat isopach against modelled pre-Holocene surface*

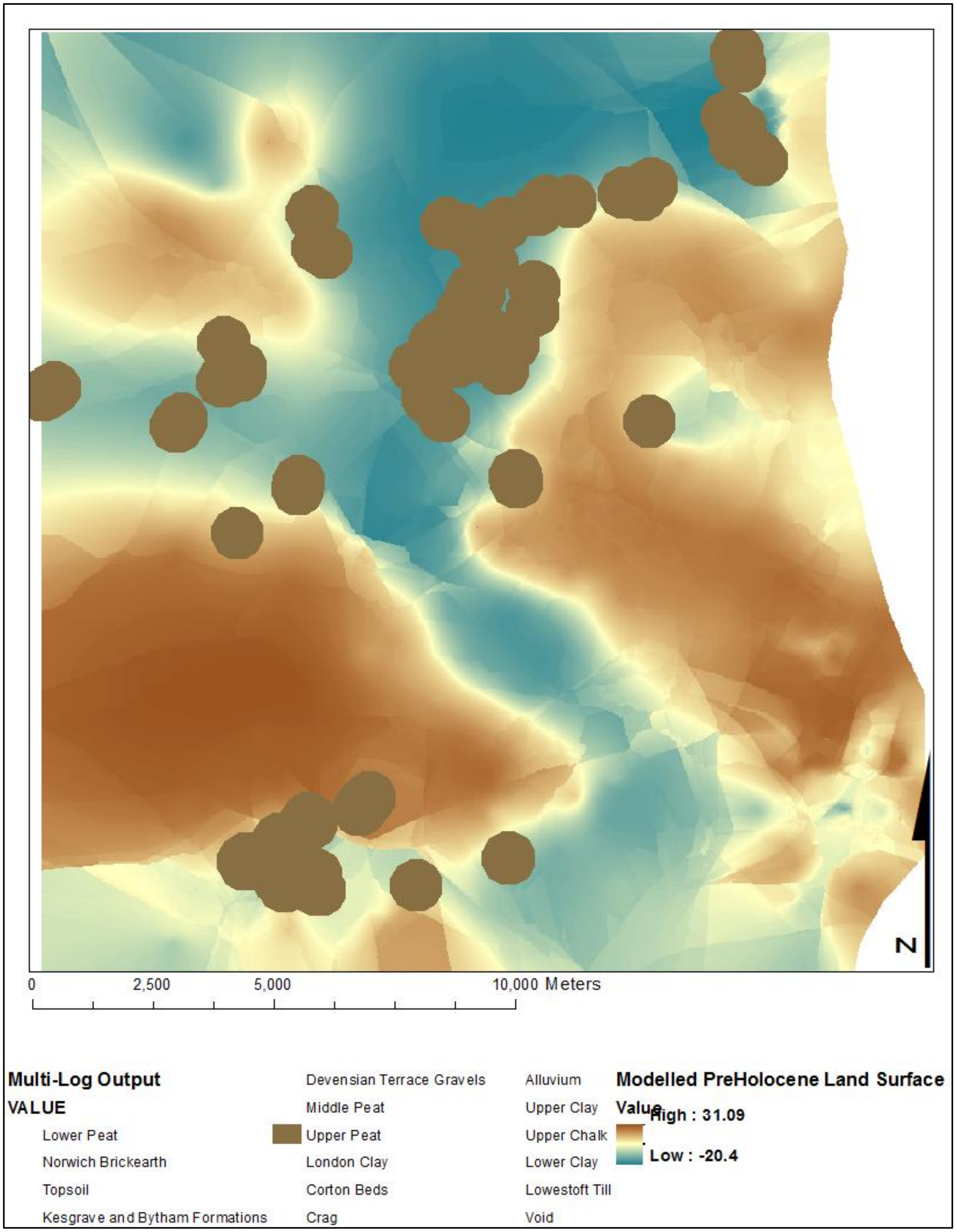


Figure 107. *Upper Peat multi log output against modelled pre-Holocene surface*

Upper Peat growth occurs where mudflats of Upper Clay were not continuously submerge and could therefore support the growth of salt-tolerant plants. Fen and swamp vegetation thrived along freshwater sources on higher outcrops of land. As estuarine conditions recede, this growth spreads throughout the valley. Upper Peat, therefore comprises compact *Phragmites*, *Carex* and *Caladium* reed and sedge peats with some intrusions of brushwood peat (Alderton 1983). Alder and *salix* species are still dominant throughout the drier study area landscape. Locally, especially at Fritton Decoy, *Betula* and *Quercus* are maintained (Alderton 1983). Today, therefore, the Waveney valley looks comparatively similar, in terms of the dominance of the river in the landscape, and the types of vegetation in the landscape, especially in the reed-swamp approach to the river, to the environmental texture at the end of the Mesolithic, during Middle Peat formation.

The Waveney Valley Sequence in Summary

The Waveney Valley offers an image of the Mesolithic as a pattern dominated by the effects of the movement of water, rising with a North Sea oscillation into a previously comparatively static, dry landscape, flooding in, draining out somewhat, flooding in again and then finally retreating once more to its modern-day position in the environment in this area. However, the changes to the environment were not limited to the river itself, but inundated the landscape, changing large and small components of the study area as would have been perceived by people dwelling within it. The Waveney valley started the Mesolithic period dry, not majorly affected by water in the landscape though the river cut a narrowly lined strip through sandy, evergreen woodland landscape. This changed, slowly at first, in patches through the early Mesolithic landscape as Lower Peat formed. Where this occurred, reed swamps expanded away from the river; local diversity began to develop down the river system. Fritton Decoy remained initially unchanged, a stable part of a landscape which was otherwise beginning to react to the effects of a higher water table. A new seasonal pattern was introduced into the landscape with the annual cycle of the developing Alder carrs. The deposition of the expanse of Lower Clay signified that water was changing the landscape much more dramatically. Fritton Decoy, after having remained stable through the early Holocene deposition of Lower Clay, was more suddenly inundated by estuarine conditions, altering this latterly protected environment. Tidal conditions in the lower valley extending up to the middle valley added a daily rhythm to life with the flooding and ebbing of the water, a cycle whose impact on life has been established by Sturt (2006). These patterns mingled with the consolidating seasonal patterns etched into the landscape by the spread of oak trees in a landscape where the previously dominant, evergreen pines have now diminished. While the whole landscape of the study area was affected, conditions differed upstream to downstream as the tidal regime only reached the mid-valley and upstream waters remained fresh, unaffected by the marine influence changing the water quality and resident species near the North Sea mouth. While spatial diversity was still a factor in the landscape, it was more of a spectrum during Lower Clay accumulation. Fritton Decoy, however, would have stood out as the degree of change wrought during this time step would have been more dramatic in this area due to their seclusion from the earlier formation of Lower Peat. By the end of the Mesolithic, the waters began to recede and peat once more began to accumulate, forming the Middle Peat stratum. The marine environment would have given way to a once again swampy, marsh landscape, with reed vegetation and mosses covering patches and hollows where the water table remained high in the approach to the river. The protected area of Fritton Decoy would have begun to close around itself again; though still more exposed and wetter than in the earlier Holocene, an isolated patch in the landscape. Localised diversity in patch-work form was once again a significant part of the landscape. The daily tidal patterns formed during Lower Clay deposition would have faded from the river valley, disentangling themselves from the increasingly well-established seasonal rhythms of deciduous vegetation. Into the Neolithic period, tidal marine conditions once more established themselves in the Waveney valley depositing the Upper Clay unit widely throughout the landscape. As the high waters ebbed, retreating from the landscape, Upper Peat began to form and the Breydon Formation reached its modern sequence, the river remaining a large, but contained, feature of the Waveney Valley study area.

Figure 108. *Protected Fritton Decoy today compared with the more exposed landscapes at Boundary Dyke and Caldecott Hall. Spatially diverse conditions are still a strong component of the Waveney landscape.*

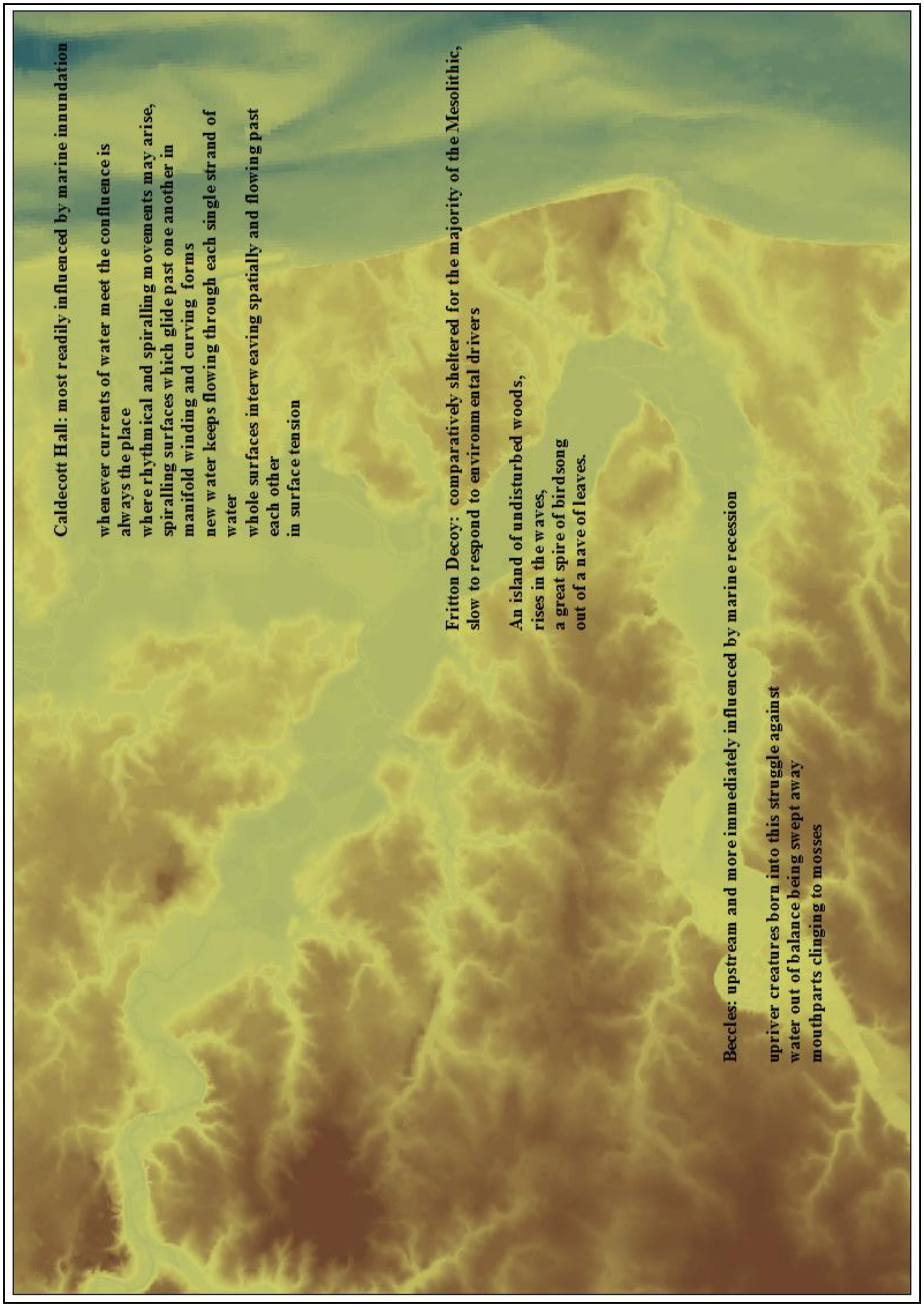


Figure 109. *The Waveney Valley with quotes by Oswald* (2002). While she originally was writing about the River Dart, these quotes both fit the Waveney valley lateral variation and emphasize that these spatial differences are typical of wetland environments.

The modelling work and analyses carried out in Chapters 5 and 6 have offered a series of refined and integrated heuristic devices through which we can better discuss the Mesolithic of the Waveney landscape. The descriptions recorded by Jennings (1951), Coles (1977), Alderton (1983) and the Suffolk River Valleys project (2008), the related borehole records and the extensive British Geological Survey archive were combined to create a new geological model used to resolve discrepancies between accounts of the Waveney geology.

By comparing the age and depth of peat sediments with their distance from the coast, two independent patterns appear, near the coast and inland, apparently driven by regional sea-level change and by local ponding respectively. This resolves the standing question of the relationship of Breydon Formation sediments with the oscillating North Sea water levels. Should further coring be conducted in this landscape, it would be particularly interesting to increase the record of dates taken from the bottom of basal peat, especially nearing the coast, as much of the current record was derived from boreholes which were not grounded out to underlying sediment. This would clarify further the role of the early Holocene regional sea-level rise in shaping the new peat growth in the rivers Waveney and Yare.

The spatial analysis of the lithic scatter locations and assemblage sizes allowed this integration of palaeogeography, palaeoenvironmental proxies and archaeology, considering, for the first time, the recursive relationship between people and their surroundings in this study area.

While no field walking or excavation was carried out to augment the archaeological information used in this study, the extant record served to establish trends in Mesolithic use of this land and, in conjunction with the new geological model, highlights key areas for future investigation. Continuing on from this study, it would be advantageous to delve further into the composition of the surface scatters recorded in Wymer's gazetteer and in the county council HERs. Specifically, it would be interesting to see if the spatial pattern of increasing assemblage sizes downstream, as indicated by the Suffolk County Council HER, is confirmed by the Norfolk County Council records. Further archaeological information, especially in situ data associated with the key Holocene stratigraphic units from near Fritton Decoy, Beccles and Caldecott Hall could serve to increase our confidence in which environmental sequences were experienced by Mesolithic communities.

Commentary on the micro-scale

Around the macro-scale study area, the very visible implications of differing definitions of the 'micro-scale' are demonstrated in the different approaches to archaeology taken along the North Sea coast. In many ways these definitions of the smallest scale of archaeological study are formed by the archaeological material found, and the variable access to this material in different regions. In Region V, I and II, Mesolithic artefacts and landscapes are buried under deep recent sediment, meaning that site-based work, focusing on single lithic scatters or a series of linked scatters is the most common focus. Indeed, the Wymer (1977) database emphasizes the importance of even single artefact finds in the British archaeological mentality. This material is hard to access, and therefore, investigation is more easily concentrated on the finds themselves often to the exclusion of surrounding contextual landscape. The ideas of movement, and this active engagement with a dynamic environment can then be lost from the interpretations formed from this material. In contrast, work at Star Carr and the Vale of Pickering, applying a high-resolution landscape approach, has argued for the importance of spatio-temporal environmental change on affecting the lives of Mesolithic inhabitants at this persistent location in the Mesolithic landscape. This is much more in line with the Dutch approach to Mesolithic archaeology which is largely influenced by the availability of the early Holocene landscape. With peat reclamation in the Netherlands, much of this early landscape is currently exposed and easily accessible to modern archaeologist who can directly interact with a geography much more similar to that experienced in the Mesolithic. Therefore, a landscape approach is more prevalent as a high-resolution micro-scale in research conducted in Regions III and IV, extending beyond lithic scatters into the surrounding surface and environmental context of these finds. Along similar lines, a single-surface onshore to near-shore approach is much more common in Region I where the high preservation of archaeological materials has been long established, allowing development of the argument for studies into the submerged prehistoric landscape. Sites like Tybrind Vig and its surrounding landscape are fundamental to the Danish mentality on Mesolithic archaeology;

as strong preservation is proved at sites like Bouldnor Cliff, perhaps this seamless approach will become more prevalent throughout the southern North Sea basin.

Applications to Region V

Applying a landscape approach as the smallest basic unit of analysis in the Waveney valley reinforces the potential of further investigation using the rich network of lithic scatters already recorded in Region V. This study has demonstrated the possibilities for using the existing borehole records to create an equally rich interpretation of the conditions and textures under which these artefacts were deposited in the shifting Mesolithic landscape. This in turn gives us a much stronger sense of Mesolithic life in this region without the need for additional prospective archaeology, field walking and excavation which can require an extensive time investment with little guarantee of return. By using a landscape micro-scale, we can legitimately apply the generous extant records to create fuller interpretations of the Mesolithic experience in this reach of the southern North Sea basin. These provide a rare opportunity for new work which significantly contributes to archaeological understanding with little need for further data collection.

The spatial variation in interpretations from the Waveney valley micro-scale study ties in well with information coming out the Vale of Pickering (Taylor 2010) that people were impacted by change across the landscape, not just changes occurring through time and between generations. However, the Vale of Pickering has been demonstrated to have been a persistent place in the Mesolithic landscape of the British coast, suggesting that shifts in local patterns could have been monitored through time. By using the spatial variations in seen in the textures of the Waveney study, we can see that dynamism in the early Holocene environment would have been perceived across all landscapes inhabited by Mesolithic communities and individuals, regardless of duration or persistency. Even on the smallest scales of study, we can see lateral variation through the region investigated; therefore, early Holocene environmental changes would have been perceived whether a place was visited once or many times.

At Bouldnor Cliff, where there are arguments for long-term settlement early in the Mesolithic, the spatio-temporal amalgamation of environmental change becomes increasing important to discussing how these communities perceived and interacted with their landscape. In this instance, the locations of the hearth finds against the palaeogeography of the cliff face are, therefore, vital in determining the shifts in the environmental textures experienced around these finds. Through this, we can come to a much more complete understanding of the influences bearing on the day-to-day activities carried out in this landscape; the conditions under which the hearths were created and placed against the cliff, thereby framing these communities' sense of home and identity within this landscape.

Applications to the wider southern North Sea basin

Further afield in the southern North Sea basin, the Waveney study caries implications for the less densely studied Regions II and IV. Interpretations of Mesolithic life are in both regions, similar to Region V, predominately directed by a small number of key sites; particularly Falloh and the Redderskneull sites in Region II and Oostwinkel and the Verrebroek Dok sites in Region IV. Isostatically similar to the Elbe valley dominated Region II, demonstrating low to moderate rates of subsidence in the early Holocene, the Waveney valley, also framed by a river system, provides an especially strong correlate for determining a study strategy in this area. With earliest peat formation beginning soon after 10,000BP in the Elbe valley, these landscapes offer each other a very useful comparison. While Region IV experienced negligible isostatic movement in the early Holocene, the interspersed clays and peats dating to the Mesolithic found in this region would likely enable a similar study. In both of these regions, the lasting suggestion of the Waveney case-study is the value for the integration of palaeoenvironmental data, palaeogeographic modelling and archaeological information across the landscape scale as the smallest unit of analysis. By establishing studies in these regions incorporating site-scale data into human-scale interpretations, the understanding of the Mesolithic in these regions could be usefully advanced.

In Region I where the density of site investigations is already much more substantial, the Waveney case-study substantiates the benefits in a single-surface approach, integrating data and analysis between studies. It is no longer acceptable to conclude with the assertion that interpretations may change with the addition of data from across a political border. The spatio-temporal dynamism of the landscape around the river Waveney, echoing that seen in the Vale of Pickering, emphatically argues that the significance of lateral diversity in influencing the Mesolithic experience of a landscape must be explored before interpretations can be achieved. Amalgamating data from component areas of analysis in Region III, could thereby alleviate confusion and discrepancies between conceptualizations of the Mesolithic in this extent of the southern North Sea basin.

I initially expected the results from the Waveney valley case-study to have the greatest bearing on strategy for the current and future work on the offshore, currently submerged section of the southern North Sea, Regions VI and VII. The macro-scale patterns of isostacy, eustacy, the hypothesised Storegga slide tsunami and the 8200 event all indicated the huge importance of these regions. The initial data and earliest artefact finds from the Doggerbank suggest that this landscape may contain the most dramatic stories from the southern North Sea Mesolithic and, thereby, may give us the most insight into interaction with truly catastrophic environmental change during this period.

The current work being conducted over these regions is exciting; however, the Waveney study has shown that a much higher resolution of data is needed before we can begin to ask the bigger questions about rate of change, expression and perception of this change, inhabitation and experience of these landscapes. While the bathymetric mapping and seismic data provide tantalizing glimpses of the material we hope to explore, this cannot impose interpretations on this data which it cannot yet support. Equally, by understanding the impact of variability across the macro-, meso- *and* micro-scales, we can definitively argue that we cannot rely on interpolating between coastally derived data points to fill in the submerged and less studied middle. Until the richer texture of the Mesolithic environment in these landscapes is better understood, the resolution of our interpretations must reflect this. Both macro-scale patterns and single borehole data can provide invaluable insight into the early Holocene inhabitation of this region, but until the human-scale landscape can be analysed, we cannot fully interpret the conditions which recursively impacted on Mesolithic communities as they moved and placed artefacts within this land in the course of their daily activities.

Implications for reconceptualising the Mesolithic

Most importantly, the Waveney valley case study echoes a critical understanding of the Mesolithic period apparent at the meso and macro scales, that of the importance of dynamism. Change to the environmental texture of the Waveney landscape wasn't limited to the flood and ebb of the river height, nor was it a consistent effect, or even a gradient, down the length of the river system. Instead, the alterations to the perceived landscape were varied through many component parameters of the environment and were in constant flux. Areas which were protected during some periods of the Mesolithic, were abruptly inundated in other periods. Individuals and groups living in this study area would have been aware of change operating on both temporal and spatial axes. Environmental change would have been perceived over space as well as time. In this way, the patchwork nature of the Mesolithic seen at the meso and macro scales is repeated at the micro scale. The changes experienced were many and were diverse. It has been argued that people engage with their surrounding environments in the course of their habitual actions, in the process of this movement, they would have encountered a landscape which challenges any notion of a static, or of a conventionally, neatly time-stepped, definition of the Mesolithic in this region. Even on the micro-scale, a dynamic definition of the Mesolithic period encompassing change across multiple axes of the e-scape is mandated by the archaeological and palaeoenvironmental evidence.

Chapter Seven: A Multi-Scalar Mesolithic

Through looking at the history and current directions of Mesolithic Archaeology (Chapter 2), a primary goal of this dissertation has become to evaluate a multiscalar approach in the southern North Sea basin, to see how or if such a methodology would strengthen the ways in which we construct the Mesolithic for our research. While the previous chapters have considered the benefits and limitations of the macro, meso and micro scale, this chapter will first summarise these contributions and then consider if an integration of these scales does change the ways in which we conceptualise the relationship between people and their environment in the Mesolithic and, thereby, influences the way we conceive of the period as a whole.

Macro-Scale

The macro-scale approach allows insight into the big patterns and the some of the driving forces behind them. This perspective provides an understanding of unifying similarities across the southern North Sea basin but, vitally, also of difference. This shows that the Mesolithic was neither environmentally nor culturally the same over the breadth of the basin, and, thus, generalisations of this period must be constructed carefully as to not obscure the reality of what people experienced during the deposition of the records we now interpret.

By highlighting areas where there are differences in the conventionally applied patterns, we can question why this is so and draw potentially new and provoking conclusions. Felix Reide's (2005) work is an example of this, considering why people would choose to live in a highly inhospitable climate despite the more general pattern which would indicate that such landscapes would be completely uninhabited. Through drawing our attention to such reversals, the macro-scale can offer the opportunity to get closer to the reality of the Mesolithic. Such work also emphasises the fact that the relationship between people and the environment is not based solely on resource availability, but goes far beyond that into the ways in which people perceive their surroundings and identify themselves within it. It teaches us that culture did not evolve smoothly and intuitively, but in many, diverse paths.

In terms of characterising the Mesolithic, the macro-scale builds a picture of high environmental dynamism; the rate of change evidenced in this period. Oscillations and shifts in rate of change seen in the large-scale models of ice-retreat and coastline evolution in the Mesolithic, the inferred influences on the character of local tides, currents and weather patterns, in combination with the macro-descriptions of vegetation change, all contribute to this characterisation.

Macro-environmental patterns offered a means of defining a spatial focus to the study region, based in parameters which contributed directly to the Mesolithic perception of their landscape. Younger Dryas ice-cover, the palaeoshoreline at 12k BP and soil typologies were used to select a lateral focus within the southern North Sea basin. Together these factors constrained the a spatial focus to the study through the application of parameters intimately tied to the general research questions. This established a pattern which could then be followed through the meso and micro scale approaches.

However, from the macro-scale perspective, it is difficult to define the texture of the place or the period. Macro patterns are mitigated, emphasiszed and evolved at smaller scales, so this scale only gives a broad generalisation which can obscure the important human-scale experiences. People and their perceptions are difficult or impossible to interpret from the macro-scale.

Meso-scale

At the meso-scale, the local expressions of the macro-scale environmental and cultural patterns are better clarified. The impacts of regional geomorphology, isostatic patterns and environmental conditions on the effects of the warming temperatures, retreating ice and rising North Sea can be interpreted to create a picture of how the perceived environment was changing, and, to some extent, of how quickly these changes were occurring. At this scale, we can discuss how people were dwelling in the environment; moving, settling, migrating within it. The meso-scale offers a better perspective on which resources would have been available within a region, and of how the texture of the environment was changing around the people living within it.

In this thesis, the meso-scale further highlighted the diversity of the environmental and cultural shifts experienced in the southern North Sea Mesolithic. This diversity led to the question of how to appropriately divide the macro-scale basin into meso-scale sections so as not to split study areas along borders; political, economic, etc., which would be inappropriate to the record being interpreted. Such meso-scale divisions were, therefore, centred on comparative zones of isostatic uplift and subsidence, one means of beginning to diffusely border individual regions for analysis within the macro-study area. While generally governed by less crustal movement than in the surrounding regions and dominated by eustacy, the isostatic responses of the southern North Sea basin in the early Holocene led to localized differences in the impact of global sea-level rise. The north-west corner of the macro-basin, Region I, the last to experience ice-cover, is the only section of this region to have demonstrated uplift, whereas the rest of the region has subsided. Maximal subsidence occurred in the currently submerged Region VII, the centre of the collapsed peripheral forebulge. To the south, Region IV experienced negligible movement while II, III, V and VI underwent varying degrees of subsidence, described in Chapter Four. While such divisions would likely not suit every research question, the meso-scale approach does importantly emphasise the necessity for borders which do reflect the questions being asked of the datasets and created the argument that ill-suited study area borders could lead to inaccurate interpretations and characterisations of the Mesolithic.

Though the meso-scale does allow interpretations of the local expressions of macro-environmental and cultural patterns, this perspective can still obscure the individual experience of the landscape formed during the Ingoldian/Evansian interaction with the world at the human-scale. The meso-scale still does not allow an interpretation of people, or of the specific environments in which they dwelled, conducted their day-to-day activities, and deposited the artefacts with which we engage today. The e-scape, as the basis for discussing perception of the environment in the Mesolithic, cannot be interpreted from this level of approach.

Micro-Scale

The micro-scale does, at last, offer a perspective on the experience of the landscape on the human-scale. It allows an evaluation of the importance of the data we collect as it pertains to an individual's or group's perception of the environment, whether it matters or not that the North Sea water level was rising. This scale builds the argument that change associated with the retreating ice following the Younger Dryas, with the net sea-level rise, with warmer temperatures affecting the vegetation and fauna was not happening in the background; the Waveney Valley study showed how these patterns were diversely expressed across both the temporal and spatial spectrums and would have been immediate components of peoples' lives. As Mesolithic individuals and communities moved within the landscapes, seascapes, e-scapes of the southern North Sea, in the course of their daily, seasonal and long-term migratory habits, they would have experienced perceivable shifts in the texture which surrounded and rooted their sense of belonging in and to the world.

In keeping with the questions raised about the spatial definitions of the macro and meso scales, the Waveney Valley study commented on the spatial definition of the micro-scale. While work at the smallest scale, constrained to single scatters or individual artefacts, is vital and adds a level of detail and analysis rarely possible on a larger scale, the degree of lateral variation, even over the smallest landscapes, emphasizes the necessity for a wider spatial window to create meaningful stories defining the Mesolithic. It is difficult to challenge the robust detail derived from highly localised studies or to offer a framework that does anything other than build from this scale of approach out. However, the absolute variability of the Mesolithic period across the North Sea basin, and even across the Waveney Valley, emphatically demonstrates that people were experiencing the landscape and variety much more widely than the smallest scale studies may at first suggest. If we are to re-envision how we construct the Mesolithic, an exclusively micro-scale approach is as insufficient as the meso or macro scales alone, as, out of the context of larger-scale studies, it does not support extrapolation; the value of micro-scale work for interpreting the Mesolithic as a period must be considered within a wider scope of work.

Unified Multi-scalar Approach

Figure 110. *On a summer's day* representing many strands amalgamating to a total of sensory dynamism (Bridget Riley 2006)

What comes out of a multiscalar approach, playing to the strengths of each epistemological scale, is a refined, integrated characterisation of the Mesolithic that incorporates all of the available evidence and consideres it symmetrically. In the process of tacking between scales to define the types and impacts of different parameters of environmental change, it becomes apparent that it is the idea of dynamism that best characterizes the Mesolithic; not simply of generalised shifts or movement, but of an active, forceful degree of change across multiple components of Mesolithic life which was a fully visceral, daily, perceivable factor of their experience. Where classifications of this period based in solely chronology, lithic typologies, environmental parameters, or cultural sequences have been demonstrated to be more fallible, the unifying concept of motion across each axis of Mesolithic life is fundamental to what we can interpret about their experience of interaction with the environment. Regardless of the extent or duration of movement undertaken, signatures of both spatial and chronological change would have been apparent to communities and individuals. The rate and largely unpredictable nature of environmental change created a unique level of dynamism in this time period; change did not operate passively in the background. As motion, over large distances or in the course of small, daily and habitual actions, has been presented as the key component of perception, this dynamism, so engaged, can be interpreted as the defining, perceived experience of Mesolithic life.

The environment across the southern North Sea basin has been shown to have been constantly and variously shifting across the macro, meso and micro scales. The interaction between different scales of change and local conditions created spatial and chronological variation in the impact of these shifts on the human-scale environment. Macro-scale patterns of eustatic sea-level oscillations combined with isostatic uplift and subsidence, which operated on the meso-scale to form diverse regional sea-level changes. The local geology of meso and micro-scale landscapes then either augmented or mitigated the impact of the shifting water level on the coastal geography, creating spatial diversity operating in conjunction with the chronological variations in sea-level and the shape of the coastline. Neither were the results of these shifts in sea-level limited to altering coastal morphology and waterways. With new degrees of water availability and energy as the sea transgressed and regressed, the sediment regimes, too, were altered, as can be seen in the Waveney valley study. Modifications in the water-table and salinity and in the sediment characteristics in turn impacted the vegetational and faunal communities present within the landscape. This affected not only resource availability, but the full texture of Finlay's (2004) e-scape creating a persistent sense of unpredictable spatio-temporal dynamism perceived not just visually, but across all the senses. All the rich detail of the landscape, including waterways, the sky and navigable pathways, would have been influenced, affecting community perception through each tangible sense.

The Waveney valley study shows that an understanding of spatio-temporal dynamism is not dependent on a macro-scale exploration or understanding of the world, but could be perceived within even localised centres of habitation during the course of routine actions, tasks and chores. Though perhaps the distance travelled would have had bearing on the magnitude of change perceived, shifts across both spatial and chronological axes would have been part of the fundamental comprehension of the Mesolithic world in North West Europe whether communities were sedentary or mobile. For largely migratory communities, those who spent less time in any one landscape and infrequently revisited sites, changes in the environmental texture over the spatial scale are likely to have been the most fundamental to their perception of the world. However, moments of temporally sudden textural change - rapid inundation or the crossing of vegetational thresholds - would have introduced the concept of temporal dynamism to these communities regardless of their transient habitation patterns. When communities were more settled, allowing individuals to spend longer stretches of time in a single location and to develop inter-generational familiarity with persistent places in the Mesolithic landscape, more subtle chronological alterations would likely have become readily apparent. Fine fluctuations in water level or salinity, the earliest introduction of new tree species, for instance, may have been more noticeable to these communities. However, the spatial variations in the reaction of component parts of a micro-landscape would have maintained their awareness of dynamism across this dimension as well. Across the landscape of the Waveney Valley, for example, the difference in the response of the protected habitat at Fritton Decoy as compared with the more inland environment starting at Boundary Dyke and the exposed alluvial fan at Caldecott Hall, would have assured that a community settling in this region comprehended diversity in the rate of change across space as well as time.

In defining the extent of southern North Sea study area and the meso and micro-regions within the basin, the idea of movement again arises. To focus research, we draw lines around a study area, to greater or lesser advantage, but as such lines are diffuse by nature, they beg the question of how people crossed over them. As purely heuristic devices, both chronological and spatial boundaries are recognised only by the researcher. People moved across and within these lines, travelling to new landscapes, engaging in revisitations of persistent places, conducting patterns of seasonal rounds by moving inland and to the coast to maximize efficient landscape use, or simply in the course of habitual daily tasks. Here too, spatial diversity coalesces with the temporal to form the intricacy of Mesolithic mobility practices. Migratory distances, recurrent settlement and the duration of inhabitation of a landscape differed throughout the southern North Sea basin and throughout the Mesolithic period. No single mould can be used to typify the entire spatio-temporal extent, other than the concept that the character, scale and level of interaction with dynamism in this period were the defining facets of Mesolithic life.

If dynamism is the essence of the period, then Mesolithic communities must have created their sense of being within the world and their identities in the midst of an active engagement, through all of their senses, with a changeable landscape. Chapter Two addressed McFadyen's (2007) proposition that people framed their sense of home in a landscape through intentional deposition of material as they migrated. The placing and moving of material through the landscape framed their internal spatial references, their intellectual and emotional orientation within the world. This involved planning for the future: to carry required items forward, to leave them with the intent of returning, or to permanently discard them as signifiers of their prior inhabitation. Such planning was carried out with an awareness of pending change to the texture of the area surrounding deposited objects, as well as of the unpredictable state of future destinations, whether familiar or not. Their sense of belonging to the world as individuals and as communities was formed with an understanding of movement across each aspect of their lives. In this way, homes, in all of their various forms, were built in the active recognition of their temporality because the e-scape itself was ever-evolving; pathways were solidly incised in the landscape despite the inevitably of change. In this way, the question is not if or how

Mesolithic coastal communities perceived environmental change, but how this perception fundamentally altered their conceptualisations of the world.

Implications for Archaeological Practice

This new definition comments on our archaeological practice in Mesolithic research and emphasises the importance of process in our methodology. Through a process-based, symmetrical approach to data, analysis and interpretation from a multiplicity of scales and disciplines, we can create fluidity and motion in our interpretations which better reflects the entanglement between scales and disciplines seen in the archaeological record. This, thereby, overcomes national, disciplinary, language and priority boundaries. We can then create integrated interpretation which facilitates assimilation of future data sources with previous and current work, and allows us a more robust perspective on Mesolithic life. By using diffuse borders, organising and focusing research within the recognition of external influence from the surrounding continuum, more sympathetic, complete interpretations can be formed. As Simeon Nelson's (2008), Figure 111, installation expresses, the more intangible elements which best inform our understandings of the world, must be allowed to escape from beyond rigid spatio-chronological structures.

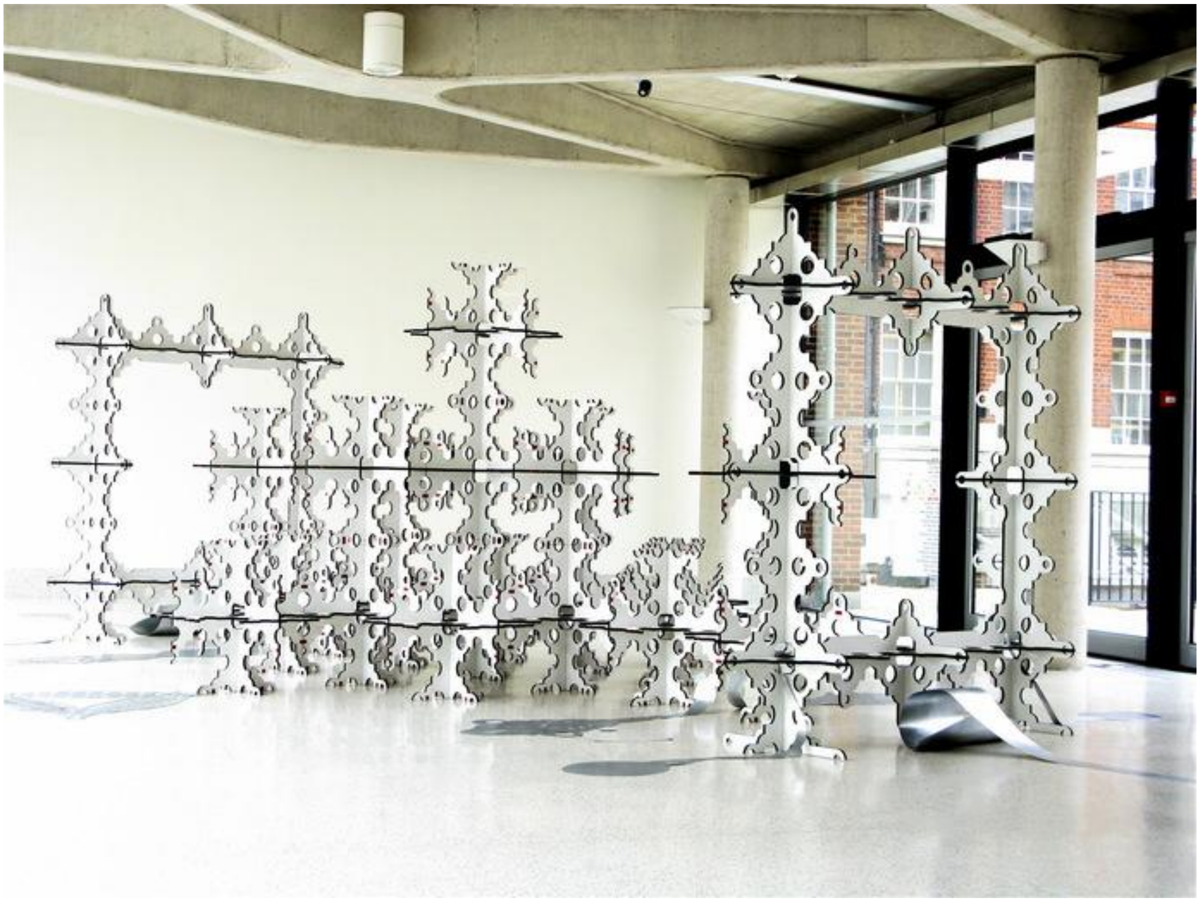


Figure 111. *Cryptosphere:* showing the escape of the interpretive, artistic cartouche elements of maps, recreated in beaten silver escaping from a rigid spatial structure representing the Cartesian co-ordinate system of our modern maps (Nelson 2008)

By focusing solely on work which investigates a single scale or thread of evidence, or stops at political boundaries, we will continue to inhibit our ability to extrapolate ideas beyond individual projects. While focused site-investigations and highly specialised studies must continue alongside exclusively macro-scale analyses, by promoting collaborative work as an archaeological community studying the Mesolithic in this region and beyond, we can open research into a better interpretive framework which supports more vigorous data integration. In this way we will limit the number of new interpretations which are presented acknowledging the likelihood of radical change upon combination with other nearby projects (e.g. Verheart 2008). It's here that the premise of a symmetrical archaeology comes into its own; by offering a structure for defining and reuniting different aspects of study, it facilitates this type of collaboration with a minimum of additional effort making it a practical inclusion into our archaeological lexicon. This thesis does not argue for an upheaval in our methodologies, but for a greater degree of finesse in pushing our interpretations further to better get as near as we can to disseminating stories of Mesolithic life that are real and meaningful.

Chapter Eight: Conclusions

This thesis began by questioning the current conceptualisations of the Mesolithic period, evaluating if they are adequate starting points for our research, and seeking to define the main themes in Mesolithic research which could steer us in more fruitful directions. The themes that emerged were those of the relationship between people and their environments, the perception people in the Mesolithic had of the landscapes in which they dwelled, and specifically of the changes in these landscapes, and the potential for using multi-disciplinary, multi-scalar approaches to improve our understandings of these questions. Therefore, macro, meso and micro scale approach to looking at the union between palaeoenvironmental and archaeological evidence, guided by Ingold and Evans, to see how these things bear on a better interpretation of life in the Mesolithic; one not based solely in resource attainment, but in an engagement with the totality of an e-scape. Archaeological and palaeoenvironmental evidence was considered on the macro and meso scales, and the principles of an integrated, multi-disciplinary epistemology were grounded in the practicalities of a micro-scale case study in the Waveney valley. Through this, this thesis questioned what each scale had to offer us and, finally, what a multi-scalar approach might give.

This thesis has contributed a few new developments in the archaeological interpretation of the southern North Sea basin at the macro, meso and micro-scales, and has offered a new conceptualisation of the Mesolithic period as a whole in which future research can be rooted. At the macro-scale, the leading models of ice-retreat and coastline evolution associated with sea-level rise were digitised and compared against each other to establish qualitatively the degree of uncertainty that should be taken into account when applying macro-scale patterns to interpretations of the human experience of these environmental modifications of the landscape. The insufficient resolution and margin of error suggested by these comparisons highlight the need for smaller-scale research in constructions of Mesolithic perception.

At both the macro and meso-scales, new ideas for structuring macro and meso scale research in southern North Sea basin. Even if these regions are not applicable to other studies, the principles can be echoed, especially the argument that study-area borders must fit the research being conducted, must fit the evidence and the questions being asked and must be a transparent part of the interpretation and reporting. Borders should not be applied without due consideration of their effect on the interpretations formed from the material encompassed within them. Even if they are mandated by external influences, the impact of borders on analysis and interpretation must be taken into account.

To explore the realities of applying the mix of phenomenological ideas, stemming from Heidegger (1971b), Ingold (2000), Evans (2003), Finlay (2003) and Nilsson (2004) to the reality of the often sparse Mesolithic record encountered in the southern North Sea basin, a case-study was conducted at the micro scale in the Waveney Valley. This case study reflected strongly the level of diversity of environmental texture experienced over time and space in the Mesolithic. It also highlighted the very complex issues in integrating palaeoenvironmental data with the archaeological record. Despite these complications, the micro-scale case study offered a series of time-slices in the evolution of the Waveney Valley environment as it may have been perceived by people living in it. This was the first interpretative effort for the Mesolithic archaeology of the Waveney landscape. This study has wider reaching implications as well, as a commentary on the spatial extent of a micro-scale project. It showed wide diversity in the reaction of the river valley to sea-level rise and climate change occurring across space, combining with the large degree of change across the temporal dimension, the amalgam of which would have been perceivable by communities dwelling within the landscape during the Mesolithic. This diversity across a constrained landscape underscores the many possible definitions of a micro-scale; ranging from a single artefact to a lithic scatter to a focused landscape such as the Waveney valley. In regions such as Region V, where a large degree of the in situ Mesolithic artefacts are not accessible without excavation, the micro-scale may be more intuitively limited to the smaller end of this spectrum, whereas in Region III, where such finds are more frequently found near the surface, the micro-scale may more naturally tend to the broader definitions. The Waveney valley study shows that by considering a larger extent of a 'micro-scale' study for interpretation of palaeoenvironmental and archaeological evidence, a better union between the two can be forged, and a clearer image of what is most fundamentally important to the experience of the environment during the Mesolithic can be formed. The inference of this work has bearing in the submerged landscapes of the southern North Sea basin where evidence from excavations will be limited and the most important, foreseeable, interpretations will come from an integration of palaeoenvironmental evidence and uncontextualised artefact finds.

The principles of a symmetrically considered, multiscalar archaeology and how they could be used to address the specific entanglements engendered by challenging our current constructions of the Mesolithic have been used to create a new conceptualisation of this period. This definition, grounded in the idea of dynamic change and the perception of this actively-engaged change through the motion engendered in the daily, habitual and longer term mobility of Mesolithic people, reflects the patch-work nature of this period and builds on it to create a categorisation of this period which better reflects the archaeological and palaeoenvironmental records than past definitions. This construction of the Mesolithic offers a strong conceptual starting point for our current and future research into the period which recognises the enmeshment of concepts, scales and disciplines of data related to this period. It is the sum of these strands of information that offers an insight into Mesolithic life. Crucially, analysis and interpretations rooted in this conceptualisation remain open to the inclusion of further data. Had this study been, conversely, disconnected from its surrounding spatial, temporal or ideological context, incorporating new data would be more disruptive. The process of developing movement in our interpretive work allows greater finesse and refinement in the future insertion of new research; results remain appropriately entangled within the larger continuum. Furthermore this methodology can be expanded beyond the particulars of this study, to the wider archaeology of the Mesolithic period, pulling in additional extant and emerging datasets from the full spectrum of research into a single-surface, global prehistory.

Figure 112. (Dewing 2010) *Objects in the (archaeological) mirror may be larger than they appear*

Future Work

Inevitably, this thesis did not accomplish everything possible or desired for the scope of the project undertaken. It will not be all things to all archaeologists. However, the limitations encountered in this work have drawn focus to the complexity of the issues we face in Mesolithic archaeology today. As we begin to ask more refined questions and demand more rigour from our methodologies, theories and interpretations, many problems remain unresolved; these tangles we have yet to unravel.

Specifically, disappointing was the lack of time to complete further analysis of the artefacts documented (Chapter Five) for the Waveney Valley, or to complete any field walking or excavation exercises to potentially add to the artefact record for this landscape. Neither were any further cores taken in order to fill in lower data-density areas of the modelled geology. Though the potential for this, explored by a site visit, was limited (Chapter Five), extra borehole data would have provided the opportunity to contribute radio-carbon dates to the record confirming the chronology of peat formation in this region. Additionally, it may have been beneficial to link together the extant core database with geophysical work such as Ground Penetrating Radar (GPR) or Electrical Resistivity Tomography (ERT). Such sub-surface imaging would have provided a degree of ground-truthing against which the modelled stratigraphy could have been compared.

However, in response to these critiques, beyond the practical constraints of a PhD project, the goals as outlined in Chapters One and Two were never compatible with conducting a full micro-scale archaeological investigation. Instead, this thesis set out to question the ways in which we think about the Mesolithic, to evaluate individual epistemological scales and a multi-scalar approach, and, therefore, to challenge the ways in which we conduct our archaeological research. The theoretical stance taken in this dissertation was then grounded in the material of the macro, meso and micro-scale and these were pushed forward to contribute to the record where possible. Especially on the micro-scale, a rigorous model of the stratigraphy and a comprehensive database of Mesolithic information from this region have advanced our interpretations of this time-period in the Waveney landscape. It may also be worth considering that the preoccupation with conducting primary lithic analysis to substantiate prehistoric research may be predominantly a reflection of the history of the archaeology conducted in Britain. While we acknowledge the fundamental role of palaeoenvironmental data and the importance of building on the datasets already available to us, Clark's excavations still linger in how we, in Britain especially, define Mesolithic archaeology. In a country like the Netherlands, with its more intrinsic landscape-based approach, I wonder if the lack of lithic investigation would be so keenly felt. This is an especially important consideration considering the data most likely to come from the submerged North Sea landscape. Geophysical and geotechnical data have some possibility to provide greater material evidence, but it is likely that we will initially be forming interpretations from palaeoenvironmental data in conjunction with scattered artefact finds pulled by chance from the sea-bed.

This dissertation has also not achieved a satisfactory integration of the chronologies of the archaeological and palaeoenvironmental records in the Waveney Valley. Perhaps had more investigation into the extant archaeological record been possible, or if in situ artefacts been available for more rigorous dating, this problem could have been better ameliorated. However, the reality of the record across much of the southern North Sea basin, and the likelihood for the record developing from the submerged North Sea, is that the resolution of Mesolithic artefact dates will be far coarser than the dates possible for palaeoenvironmental evidence. Even with the ability to carbon date evidence from borehole records, these dates, as in the Waveney Valley, are often in a wide-spread net across the landscape and it is not always possible to support the resolution of information which would be preferred for interpretation. The stance adopted in the micro-scale case study in this project was, therefore, to recognise this limitation as a constraint, but not as one which negates the value of the evidence we do have. By building time steps of environmental sequence of the Waveney Valley and considering these in the context of the established spatial patterns of archaeological finds, an understanding of the key factors of the landscape perceived in the Mesolithic Waveney Valley could be constructed. Though this is certainly not a universally applicable approach, the framework for transparently considering the limitations of the available datasets and yet forming interpretations based on their potential within these constraints, is still useful. The Waveney Valley case study serves as a ground-truthing exercise proving the benefits of such a methodology.

Integrating multi-disciplinary work across these scales is complex and challenging. The sources, methods, processing, interpretation and language disseminating these datasets are as widely varied as the Mesolithic period itself. To draw these together into a unifying interpretation is a demanding enterprise. Therefore, it is an important contribution of the theoretical framework employed in this thesis that it remains open and actively receptive to the potential incorporation of future data. As new data is generated from the submerged North Sea landscape and its coastal surroundings, the symmetrical organisation used here readily offers the opportunity for further data assimilation into the network of extant information. As Witmore (2007) argues for symmetrical archaeology, this dissertation does not reclaim a flawlessly united total archaeology, but has used these guiding principles in the southern North Sea on the macro- meso, and micro-scales to demonstrate practical occasions where common ground and the opportunity for unification are found. Here, through the process of a multi-scalar, interdisciplinary archaeology, these concepts can be usefully applied to improve our interpretations of the Mesolithic experience of their world. There are still many issues to be resolved in the effort to create amultidisciplinary, multiscalar archaeology. However, the argument which stems from this thesis is that, despite these issues, it has been shown that the interpretations drawn from a single-scalar approach can be critically incomplete. Therefore, even though an integrated methodology has unresolved problems, the future of Mesolithic archaeology, if it is to offer the best possible results from the data we have available to us, must lie in this direction.

As a final note, recent working groups (e.g. MESO2010) and the media have considered the applicability of Mesolithic data in conversations regarding the possible impacts of current and future climate change on our communities. This dissertation has taken the stance that the two situations are still non-analogous in terms of rate of change; sea-level rise and environmental proxy change occurred at rates which far out-strip those which we are currently experiencing today. Therefore, the attempt has been made to keep these ideas separate; to minimally inform reconstructions of the early Holocene environment with modern ideas about climate change and our expectations of how communities react, physically and ideologically, to this driver. However, the importance of studying this period as a unique entity has also been emphasized. In closing, I would like to wonder about the impact of our current climate predicament on underscoring the relevance of Mesolithic research, not remotely as a direct corollary, but as a framework for exploring how people have in the past, and might today, perceive environmental dynamism and how this perception impacts their sense of identity and place within their surroundings.

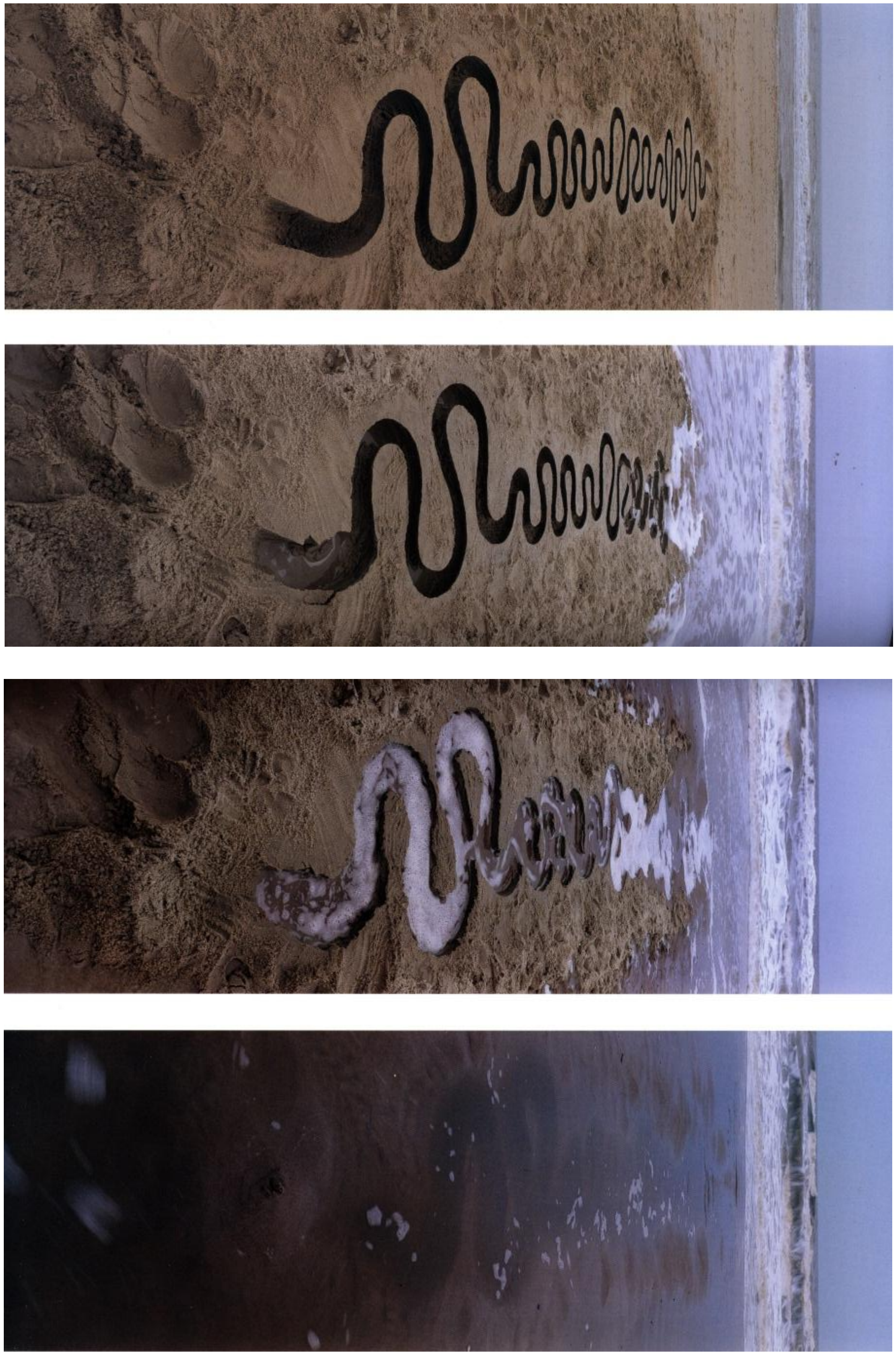


Figure 115. *Saturday on the beach, Schoorl Provinci Noord-Holland,* worked in glacially deposited white sand. "In the end, it all happened extremely quickly... I wished it had been a little slower" (Goldsworthy 2000, 130).

Appendix A: Borehole: Locations (in OSGB 36)

Borehole ID	Easting	Northing	Elevation (m ODN)
Alder Carr 1	642780	292590	-1
Alder Carr 2	642803	292566	-1.05
Alder Carr 3	642821	292549	-1.05
Alder Carr 4	642860	292510	0.1
Alder Carr 5	642851	292519	-0.85
Alder Carr 6	642835	292534	-1.05
Alder Carr 7	642791	292578	-0.95
AWA Bores - R. Yare 6/4	651959	307784	1.7
AWA Bores - R. Yare 6/5	651886	307749	2
AWA Bores - R. Yare 6/6	651933	307690	2.4
Beccles By Pass - river crossing 15/2/B	642060	291420	0
Beccles By Pass - river crossing 16/2/B	642060	291440	0.05
Beccles By Pass - river crossing 16/3/B	641469	291732	1.85
Beccles By Pass - river crossing 16/4/B 1	641464	291639	0.9
Beccles By Pass - river crossing 16/4/B 2	641788	291579	0.9
Beccles By Pass - river crossing 16/8/B	642070	291420	1.2
Beccles By Pass - river crossing 17/1/B	641887	291533	0.95
Beccles By Pass - river crossing 17/2/B	642047	291400	1.05
Beccles By Pass - river crossing 17/2/T	642366	291294	0.95
Beccles By Pass, Gillingham-Beccles 9/1/B	641380	291770	0.45
Black Mill 2	647551	295624	0.6
Black Mill 3	647030	294910	0.1
Black Mill 4	647255	295207	-0.5
Black Mill 5	647790	295960	-0.3
Boundary Dyke 1	649083	291981	-0.55
Boundary Dyke 2	649157	291710	-0.6
Boundary Dyke 3	649231	291457	-0.25
Boundary Dyke 4	649018	292200	-0.5
Boundary Dyke 5	649320	291140	-0.4
Boundary Dyke 6	649286	291235	-0.3
Boundary Dyke 7	649266	291309	0.03
Boundary Dyke 8/2	648900	292580	-0.65
Boundary Dyke 9	648900	292580	-0.7
Caldecott Hall 1	647000	301800	-0.2
Caldecott Hall 2	646840	301920	-0.6
Caldecott Hall 3	646644	302046	-0.5
Caldecott Hall 4	646460	302180	-0.4
Caldecott Hall 5	646918	301854	-0.5
Castle Marsh 1	648010	292120	-0.5
Castle Marsh 2	647860	291730	-0.1
Castle Marsh 3	648190	291840	-0.6

Castle Marsh 4	648210	291860	0.8
Castle Marsh 5	647948	291966	-0.5
Castle Marsh 6	647978	292042	-0.5
Coles -- 14C Core2	632630	307750	0.5
Coles-14C Core1	635370	304490	-0.3
Cove Staithe 1	646490	290590	0.3
Cove Staithe 2	646580	291090	-0.2
Cove Staithe 3	646537	290888	-0.4
Cove Staithe 4	646512	290714	-0.1
Fritton Decoy 1	647080	299700	1.11
Fritton Decoy 2	647086	299659	1.3
Fritton Decoy 3	647100	299570	1
Fritton Decoy 4	647100	299594	1.1
Gillingham Marsh 1	642180	292150	0.5
Gillingham Marsh 2	642191	292128	0.15
Gillingham Marsh 3	642220	292070	0.05
Gillingham Marsh 4	642201	292108	0.05
Gillingham Marsh 5	642210	292088	0.05
Haddiscoe Bridge North 1	645420	299200	2.5
Haddiscoe Bridge North 162/40	645282	299023	0.4
Haddiscoe Bridge North 2	645400	299180	-0.15
Haddiscoe Bridge North 3	645390	299150	1
Haddiscoe Bridge South 1	645270	299010	0.4
Haddiscoe Bridge South 2	645300	299030	2.5
Haddiscoe Bridge South 3	645290	299040	2.3
Haddiscoe Bridge South 4	645300	299070	2.25
Haddiscoe Bridge South 5	645320	299050	0.4
Hall Quay, Yarmouth 1	652184	307533	2
Hall Quay, Yarmouth 2	652065	307585	2
Hall Quay, Yarmouth 3	652093	307551	2
Hall Quay, Yarmouth 4	652134	307509	2
Hall Quay, Yarmouth 5	652167	307465	2
Hall Quay, Yarmouth 6	652209	307429	2
Hall Quay, Yarmouth 7	652197	307475	2
Hall Quay, Yarmouth 8	652218	307442	2
Hall Quay, Yarmouth P2/3	652232	307431	2
Hall Quay, Yarmouth P2a	652052	307605	2
Long Dam Level 1	646920	292010	-0.25
Long Dam Level 10	646839	291601	-0.25
Long Dam Level 2	646890	291860	-0.25
Long Dam Level 3	646845	291715	-0.25
Long Dam Level 4	646799	291393	-0.3
Long Dam Level 5	646804	291462	-0.25
Long Dam Level 6	646760	291210	-0.2

Long Dam Level II 1	647060	291690	-0.45
Long Dam Level II 2	646933	291760	-0.01
Marsh Lane 1	645160	291460	0.2
Marsh Lane 2	645026	291195	0.02
Marsh Lane 3	645091	291324	0
Marsh Lane 4	644930	290990	-0.05
Marsh Lane 5	644962	291066	0.07
Queen Anne's Road Section 223	652104	305971	2.5
Queen Anne's Road Section 301	652126	305956	1.15
Queen Anne's Road Section 318	652150	305940	0.4
Queen Anne's Road Section IGS 162/38	652181	305927	1.95
Queen Anne's Road Section IGS 162/39	652209	305906	1.9
Queen Anne's Road Section P101	652234	305897	1.6
Queen Anne's Road Section P103	652260	307889	1.25
Queen Anne's Road Section P105	652302	305867	0.25
Richard's Shipyard 1	652333	306960	1.95
Richard's Shipyard 2B	652357	306976	1.6
Scale Marsh 1	646120	299430	0.6
Scale Marsh 2	646151	299450	0.5
Scale Marsh 3	646188	299475	0.4
Scale Marsh 4	646218	299493	0.2
Scale Marsh 5	646248	299511	0.1
Scale Marsh 6	646271	299525	0.15
Scale Marsh 7	646290	299540	0.2
Share Marsh 1	649460	293040	-0.75
Share Marsh 2	649605	292948	-0.7
Share Marsh 3	649733	292866	-1
Share Marsh 4	649870	292775	-0.9
Share Marsh 5	650040	292644	-0.9
Share Marsh 6	650220	292550	-0.5
Share Marsh II 1	649660	293610	-0.6
Share Marsh II 2	649690	293570	-0.9
Share Marsh II 3	649677	293587	-0.9
Short Dam Level 1	648970	292850	1.75
Short Dam Level 2	648770	292950	-0.75
Short Dam Level II 1	649320	293090	-0.6
Short Dam Level II 2	649104	293185	-0.65
Short Dam Level II 3	649187	293147	-0.6
Short Dam Level II 4	649030	293220	-0.6
Somerleyton Marsh 1	647900	296110	-0.33
Somerleyton Marsh 2	648090	296330	0.3
Somerleyton Marsh 3	648005	296226	-0.4
SRV1 Beccles 1	642324	291930	-0.556
SRV1 Beccles 10	642301	291895	-0.269

SRV1 Beccles 11	642298	291904	-0.265
SRV1 Beccles 12	642294	291914	-0.374
SRV1 Beccles 13	642292	291924	-0.35
SRV1 Beccles 14	642290	291182	-0.331
SRV1 Beccles 15	642287	291943	-0.261
SRV1 Beccles 16	642285	291953	-0.361
SRV1 Beccles 17	642284	291963	-0.321
SRV1 Beccles 18	642283	291973	-0.309
SRV1 Beccles 19	642285	291982	-0.246
SRV1 Beccles 2	642337	291932	-0.486
SRV1 Beccles 20	642288	291992	-0.227
SRV1 Beccles 21	642291	292001	-0.083
SRV1 Beccles 22	642296	292010	-0.174
SRV1 Beccles 23	642302	292018	-0.155
SRV1 Beccles 24	642308	292014	-5.71
SRV1 Beccles 25	642304	292006	-0.552
SRV1 Beccles 26	642298	291997	-0.453
SRV1 Beccles 27	642296	291990	-0.517
SRV1 Beccles 28	642294	291981	-0.717
SRV1 Beccles 29	642294	291963	-0.78
SRV1 Beccles 3	642337	291932	-0.515
SRV1 Beccles 30	642297	291944	-0.58
SRV1 Beccles 31	642301	291927	-0.721
SRV1 Beccles 33	642315	291889	-0.688
SRV1 Beccles 34	642324	292002	-0.525
SRV1 Beccles 35	642321	291996	-0.542
SRV1 Beccles 36	642316	291988	-0.543
SRV1 Beccles 37	642313	291982	-0.507
SRV1 Beccles 38	642310	291976	-0.559
SRV1 Beccles 39	642310	291963	-0.558
SRV1 Beccles 4	642362	291941	-0.54
SRV1 Beccles 40	642314	291946	-0.542
SRV1 Beccles 41	642317	291929	-0.645
SRV1 Beccles 42	642322	291911	-0.607
SRV1 Beccles 43	642330	291891	-0.659
SRV1 Beccles 44	642306	291937	-1.694
SRV1 Beccles 45	642307	291927	-1.376
SRV1 Beccles 46	642297	291934	-0.415
SRV1 Beccles 5	642377	291944	-0.563
SRV1 Beccles 6	642391	291949	-0.508
SRV1 Beccles 7	642405	291953	-0.626
SRV1 Beccles 8	642309	291887	-0.327
SRV1 Beccles 9	642305	291886	-0.266
SRV2 Beccles 1	642357	291943	0.028

SRV2 Beccles 2	642387	291946	0.017
Stanley Carr 1	643972	292922	0.75
Stanley Carr 2	643840	292770	0.27
Stanley Carr 3	643887	292827	0.25
Stanley Carr 4	643918	292864	0.4
Stanley Carr 5	644060	293020	0.5
Stanley Carr 6	643858	292793	0.52
Sutton's Farm 1	645510	292150	-0.7
Sutton's Farm 2	654388	291933	-1
Sutton's Farm 3	645304	291784	-1
Sutton's Farm 4	645249	291660	0.2
Sutton's Farm 5	645190	291550	-0.3
Sutton's Farm 6	645457	292057	-0.03
TG30NE10 Oaks Farm Southwold	639710	305180	15.2
TG30SE100 -- University of East Anglia	639860	301680	-1
TG30SE101 -- University of East Anglia	639860	301680	-1
TG30SE102 -- University of East Anglia	639770	301520	-1
TG30SE103 -- University of East Anglia	639600	301420	-1
TG30SE104 -- University of East Anglia	639450	301350	-1
TG30SE97 -- University East Anglia	637530	301520	-2
TG30SE98 -- University of East Anglia	637390	301430	-2
TG30SE99 -- University of East Anglia	637280	301360	-2
TG40NE10 -- UEA	647800	307210	-1.1
TG40NE11 -- UEA	647670	309310	-1
TG40NE12 -- UEA	647610	309620	1.1
TG40NE13 -- UEA	647500	309970	0
TG40NE18	646240	308930	-1.4
TG40NE2	649480	305420	3
TG40NE21	649990	308940	1
TG40NE22	647400	305610	-1
TG40NE23	647460	305320	1
TG40NE24	647390	307260	-1
TG40NE25	649470	305460	2.6
TG40NE26	649690	305540	0.7
TG40NE27	649890	305750	1
TG40NE28	649690	305750	0.6
TG40NE29	648970	305910	-1
TG40NE3 -- UEA	647740	308920	-0.5
TG40NE30	651670	308500	1
TG40NE31	649340	305570	1.4
TG40NE32	649420	305790	-1
TG40NE33	649420	305990	-1
TG40NE34	649410	306280	-1
TG40NE35	649370	306580	-1

TG40NE36	648900	305490	1.6
TG40NE37	648900	305400	1.1
TG40NE38	648940	305560	1.1
TG40NE39	648920	305800	-0.1
TG40NE4 -- UEA	647510	309990	-0.1
TG40NE40	648820	306120	0.9
TG40NE41	648810	306400	0.5
TG40NE42	648220	305390	2.5
TG40NE43	648220	305580	0
TG40NE44	648190	305930	-1.7
TG40NE45	648180	306220	-1
TG40NE46	647740	305700	-2
TG40NE47	647630	305880	-1
TG40NE48	647720	305390	2.8
TG40NE49	647650	305450	-1
TG40NE5 -- UEA	647730	308850	-0.7
TG40NE51	647940	305580	-1
TG40NE53	647520	305220	2.6
TG40NE54	647780	307030	-0.4
TG40NE55	647330	307610	-1
TG40NE56	647390	307940	-1.1
TG40NE57	647370	308370	-1.3
TG40NE6 -- UEA	647820	308410	-1.3
TG40NE65	648040	307860	-1.3
TG40NE66	647930	308550	-1
TG40NE67	647630	309500	2
TG40NE68	648530	308960	-1
TG40NE69	648150	309100	-1
TG40NE7 -- UEA	647950	308600	-0.9
TG40NE70	645730	307050	-1
TG40NE71	646840	306070	-0.8
TG40NE72	645210	307650	-0.5
TG40NE73	647400	305660	-1
TG40NE8 -- UEA	648160	306270	1
TG40NE9 -- UEA	648010	307790	-1.4
TG40NE95	648180	306220	-1
TG40NW10	640970	305500	5.9
TG40NW11	642990	305110	-1
TG40NW12	643080	305080	-1
TG40NW13	643140	305050	-1
TG40NW14	643270	305000	-1
TG40NW21	642970	305110	-1
TG40NW22	642920	305130	-0.9
TG40NW23	642870	305150	-0.7

TG40NW24	642880	305170	-0.6
TG40NW25	642880	305170	-0.6
TG40NW29	642960	305450	2
TG40NW70	640890	305750	0
TG40NW75	640290	306640	0
TG40NW9	641980	306610	16
TG40SE1	646900	300300	-0.5
TG40SE10	645790	304030	1
TG40SE102	649800	300700	11
TG40SE106	649900	300920	6
TG40SE107	649900	300990	4
TG40SE11	645870	304020	1
TG40SE12	645890	304010	1
TG40SE13	645900	304010	1
TG40SE14	645840	304030	-1
TG40SE16	648950	301960	10.7
TG40SE17	648980	302030	10.3
TG40SE18	649000	302030	10.5
TG40SE19	649020	302070	10.2
TG40SE2	647150	300440	14.6
TG40SE20	649850	300830	14
TG40SE21	649920	300980	4
TG40SE22	647440	303120	-1
TG40SE23	647470	303620	-1
TG40SE24	647250	303680	-1
TG40SE25	646920	302830	-0.5
TG40SE26	646490	303260	-0.3
TG40SE27	647160	302730	-1
TG40SE28	646850	304930	-0.2
TG40SE29	646690	304640	-0.2
TG40SE3	648710	304600	9.8
TG40SE30	647090	304590	-0.1
TG40SE31	646760	303860	-0.2
TG40SE32	646600	304070	-0.5
TG40SE33	646440	304330	0
TG40SE34	645880	303770	0
TG40SE35	646210	303570	-0.3
TG40SE36	646340	303520	0
TG40SE37	645980	303140	-0.5
TG40SE38	645670	303180	-0.5
TG40SE39	645380	303370	1
TG40SE4	645770	304050	1
TG40SE40	645320	302850	-0.4
TG40SE41	645020	302830	0

TG40SE42	645040	303070	0.4
TG40SE43	645020	303460	0.2
TG40SE44	645610	302630	-0.6
TG40SE45	645890	302530	-0.5
TG40SE46	646390	304830	0
TG40SE47	646040	304800	-0.5
TG40SE48	645650	304930	0
TG40SE49	645380	304960	0
TG40SE5	645610	304110	0
TG40SE50	645010	304920	0
TG40SE51	646210	304820	0
TG40SE52	646990	302520	0
TG40SE53	646720	302550	0
TG40SE54	646530	302650	0
TG40SE55	646890	303350	0
TG40SE56	645770	304070	0
TG40SE57	645500	304200	0
TG40SE58	645310	304300	0
TG40SE59	645040	304350	0
TG40SE6	645470	304170	-0.5
TG40SE60	645090	303990	0
TG40SE61	645330	303580	0
TG40SE62	645510	300480	0
TG40SE63	645270	300500	0
TG40SE64	645130	300540	0
TG40SE65	646950	301820	0
TG40SE66	646650	302040	0
TG40SE67	646460	302170	0
TG40SE68	646820	301930	0
TG40SE69	645410	302470	0
TG40SE7	645320	304230	-0.5
TG40SE70	645160	302440	0
TG40SE71	645630	302120	0
TG40SE72	645380	302230	0
TG40SE73	645870	302080	0
TG40SE74	645620	301750	0
TG40SE75	645430	301820	0
TG40SE76	645130	301940	0
TG40SE77	645010	301960	0
TG40SE78	645910	301680	0
TG40SE79	646070	301960	0
TG40SE8	645110	304310	-0.2
TG40SE80	646260	302340	0
TG40SE81	646070	302450	0

TG40SE82	645770	301740	0
TG40SE83	645380	301180	0
TG40SE84	645260	301320	0
TG40SE85	645150	301470	0
TG40SE86	645020	301600	0
TG40SE87	645020	301060	0
TG40SE88	645570	300090	0
TG40SE89	645230	300060	0
TG40SE9	645010	304340	-0.2
TG40SE90	645010	300130	0
TG40SE91	645590	300940	0
TG40SE92	646340	301500	0
TG40SE93	646300	301720	0
TG40SE94	646080	301460	0
TG40SE95	647040	302460	0
TG40SW1	640290	304900	14
TG40SW10	640230	302800	0
TG40SW100 -- UEA	642700	300940	-0.3
TG40SW101 -- UEA	642750	300850	-0.2
TG40SW102	643160	304340	0
TG40SW103	643240	304430	0
TG40SW104	643380	304420	0
TG40SW105	642990	304440	0
TG40SW106	642790	304480	0
TG40SW107	642670	304460	0
TG40SW108	642590	304440	0
TG40SW109	644970	300600	-0.3
TG40SW11	640250	302870	-0.2
TG40SW110	644500	304520	0.7
TG40SW111	643870	304770	-0.1
TG40SW112	643310	304980	-1
TG40SW121	642900	301720	0.7
TG40SW122	642950	301700	0.2
TG40SW123	642900	301680	0.8
TG40SW124	642920	301680	0.6
TG40SW125	642890	301640	0.8
TG40SW131	640001	301081	2.1
TG40SW132	640667	301343	1.48
TG40SW133	642496	301510	0.78
TG40SW14	641050	302460	-0.6
TG40SW15	641020	302370	-0.6
TG40SW16	640780	301580	-1
TG40SW17	641380	301930	0.2
TG40SW18	641380	301880	0

TG40SW19	641350	301700	0
TG40SW2	642400	303360	11
TG40SW20	641330	301580	0
TG40SW21	640830	301730	-0.8
TG40SW22	641370	301790	0
TG40SW23	643310	304990	0
TG40SW24 -- UEA	643450	304930	-0.6
TG40SW25 -- UEA	643570	304880	-0.2
TG40SW26 -- UEA	643760	304820	-0.2
TG40SW27 -- UEA	643910	304770	-0.1
TG40SW28 -- UEA	643990	304730	-0.1
TG40SW29 -- UEA	644070	304700	-0.1
TG40SW30 -- UEA	644170	304670	0
TG40SW31 -- UEA	644290	304620	0.3
TG40SW32 -- UEA	644920	304380	0.3
TG40SW33 -- UEA	644770	304430	0.1
TG40SW34 -- UEA	644640	304480	0.7
TG40SW35 -- UEA	644510	304530	0.8
TG40SW36 -- UEA	644390	304580	0.8
TG40SW37 -- UEA	640800	301410	-0.6
TG40SW38 -- UEA	640710	301350	-0.9
TG40SW39 -- UEA	640060	300730	0
TG40SW4	640000	302080	0
TG40SW40 -- UEA	640170	300870	-0.3
TG40SW41 -- UEA	640230	300930	-0.5
TG40SW42 -- UEA	640330	301030	-0.5
TG40SW43 -- UEA	640410	301110	-0.6
TG40SW44 -- UEA	640480	301880	-0.8
TG40SW45 -- UEA	640590	301260	-0.8
TG40SW46 -- UEA	642730	300220	1.5
TG40SW47 -- UEA	642740	300270	-0.2
TG40SW48 -- UEA	642780	300470	-0.3
TG40SW49 -- UEA	642800	300600	-0.1
TG40SW5	640050	302220	0
TG40SW50 -- UEA	642820	300730	-0.2
TG40SW51 -- UEA	642690	300010	-0.1
TG40SW52 -- UEA	642710	300130	-0.1
TG40SW53 -- UEA	642850	300330	-0.4
TG40SW54 -- UEA	640860	301830	-0.7
TG40SW55 -- UEA	640910	301970	-0.5
TG40SW56 -- UEA	640980	302230	-0.6
TG40SW58 -- UEA	640920	302050	-0.7
TG40SW59	640620	301440	-0.3
TG40SW6	640090	302370	0

TG40SW60	640660	301400	0.6
TG40SW61	640810	301200	-0.5
TG40SW62	640750	301380	-0.5
TG40SW63	640720	301320	-0.5
TG40SW64	640710	301330	-0.5
TG40SW65	640700	301340	-0.5
TG40SW66	643610	301710	0
TG40SW67	643590	301730	0
TG40SW68	643580	301740	0
TG40SW69	640190	301140	0.6
TG40SW7	640120	302470	0
TG40SW70	640190	301130	-0.5
TG40SW71	640170	300970	-0.5
TG40SW72	641030	301600	-0.5
TG40SW73	641030	301610	-0.5
TG40SW74	641030	301590	-0.5
TG40SW75	641030	301370	-0.5
TG40SW76 -- UEA	641030	301470	-0.5
TG40SW77 -- UEA	641020	301650	0.6
TG40SW78 -- UEA	641020	301630	-0.4
TG40SW79 -- UEA	641020	301710	0.9
TG40SW8	640160	302580	0
TG40SW80 -- UEA	641020	301720	0.5
TG40SW81 -- UEA	641020	301730	1
TG40SW82	641020	301810	-0.5
TG40SW83	640580	301490	-0.4
TG40SW84	640210	301350	-0.5
TG40SW85	640200	301260	-0.5
TG40SW86	640210	301340	-0.5
TG40SW87	640210	301330	-0.5
TG40SW88	640200	301300	-0.5
TG40SW89	640200	301280	-0.5
TG40SW9	640210	302700	0
TG40SW90	640190	301190	0.6
TG40SW91	640190	301200	0.6
TG40SW92	640190	301210	0.6
TG40SW93	640190	301230	0.6
TG40SW94 -- UEA	642360	301550	0
TG40SW95 -- UEA	642370	301560	0.8
TG40SW96 -- UEA	642430	301430	-0.1
TG40SW97 -- UEA	642470	301370	-0.6
TG40SW98 -- UEA	642520	301280	-0.6
TG40SW99 -- UEA	642600	301130	-0.3
TG50NW1	652150	308080	3.6

TG50NW10	652010	308420	1.83
TG50NW1001	652590	306730	2.44
TG50NW1002	651730	306850	0.67
TG50NW1003	652010	308420	1.83
TG50NW1005	652040	305910	1.22
TG50NW1006	652040	305910	0.6
TG50NW1011	652280	308190	3.8
TG50NW1012	651720	306840	0.7
TG50NW1017	651900	308800	1.7
TG50NW1019	652700	307900	2.3
TG50NW1021	652860	306970	3
TG50NW1022	652240	307900	4.8
TG50NW1026	652040	305910	0.9
TG50NW1031	652590	306890	4.4
TG50NW1033	652800	307010	3.5
TG50NW1076	651890	306020	2
TG50NW1077	651890	306140	2
TG50NW1078	651960	306150	1.3
TG50NW1079	651950	306070	1.4
TG50NW1080	651890	306060	0
TG50NW1081	651930	306020	1.4
TG50NW1082	651930	306130	1.5
TG50NW1083	651910	306150	1.7
TG50NW1084	651960	306100	-0.45
TG50NW117	651400	308880	0.7
TG50NW122	651800	307180	0.3
TG50NW123	651760	306990	0.4
TG50NW124	651740	306910	0.6
TG50NW125	651720	306850	0.7
TG50NW126	651690	306770	0.9
TG50NW127	651660	306700	1.1
TG50NW128	651650	306670	1.3
TG50NW129	651640	306600	1.7
TG50NW13	652040	305910	1.22
TG50NW130	651650	306570	1.6
TG50NW131	651610	306530	1.7
TG50NW132	652420	307910	2.9
TG50NW133	652490	307890	1.9
TG50NW134	652500	307880	2
TG50NW135	652520	307860	1.8
TG50NW136	652530	307850	1.8
TG50NW137	652550	307810	2.2
TG50NW138	652570	307690	3.5
TG50NW139	652600	307580	4.5

TG50NW14	652300	307400	1.83
TG50NW141	651620	308060	-0.1
TG50NW143	651860	308610	0.9
TG50NW144	652000	308560	0.4
TG50NW145	652080	308610	0
TG50NW146	651523	306402	0.02
TG50NW147	651519	306288	0.02
TG50NW148	651519	306288	0.02
TG50NW149	651483	306126	1.23
TG50NW161	652585	305950	1.86
TG50NW162	652555	305910	1.71
TG50NW163	652435	305870	2.13
TG50NW165	652070	306510	0.06
TG50NW166	652060	306530	0.18
TG50NW167	652060	306550	0.4
TG50NW168	652040	306540	0.12
TG50NW169	652010	307380	2.49
TG50NW17/A	652590	305890	1.7
TG50NW17/B	652590	305890	1.7
TG50NW17/C	652590	305890	1.7
TG50NW170	651890	307240	1.29
TG50NW171	651800	307100	1.14
TG50NW172	651770	306940	1.19
TG50NW173	651790	306830	0.74
TG50NW174	651820	306780	0.5
TG50NW175	651920	306540	0.53
TG50NW176	652090	306340	0.65
TG50NW177	652170	306240	0.95
TG50NW178	652180	306190	0.84
TG50NW179	652160	306170	0.65
TG50NW180	652440	305850	2.13
TG50NW181	652190	306150	1.04
TG50NW182	652170	306160	0.6
TG50NW183	652220	306140	1.1
TG50NW184	652230	305930	1.1
TG50NW187	652480	306950	2.79
TG50NW188	652600	306700	1.76
TG50NW189	652650	306720	1.65
TG50NW190	652720	306880	1.72
TG50NW191	652730	306880	1.72
TG50NW192	652980	306750	4.04
TG50NW193	653060	306760	4.84
TG50NW194	653110	306980	3.59
TG50NW195	653080	306530	4.59

TG50NW196	652760	306560	3.35
TG50NW197	653060	306290	4.61
TG50NW198	652680	307660	2.42
TG50NW199	652640	307660	2.29
TG50NW20	652580	306730	2.44
TG50NW200	652570	307630	2.65
TG50NW201	652570	307680	3.5
TG50NW202	652560	307600	3.63
TG50NW204	652510	307610	6.89
TG50NW206	651995	307470	0.9
TG50NW207	651995	307495	0.5
TG50NW208	651930	307515	0.7
TG50NW209	652170	306160	0.6
TG50NW210	652170	306140	0.6
TG50NW227	651990	306200	0
TG50NW228	651900	306310	0
TG50NW229	651650	306430	0
TG50NW23	652700	305950	1.83
TG50NW231	651780	306430	0
TG50NW232	651680	306480	0
TG50NW233	651710	306480	0
TG50NW235	651500	306390	0
TG50NW236	651530	306260	0
TG50NW237	651480	306100	0
TG50NW24	652860	306970	4.27
TG50NW242	651530	306650	0
TG50NW243	651510	306760	0
TG50NW244	651470	307130	0
TG50NW25	652800	307010	4.27
TG50NW250	651570	306570	0
TG50NW253	652500	306848	0
TG50NW254	652526	306767	0
TG50NW255	652545	306685	0
TG50NW256	652500	306845	0
TG50NW257	652516	306799	0
TG50NW258	652535	306728	0
TG50NW29	652250	305900	0.554
TG50NW3	652300	306230	3.5
TG50NW31	652025	305630	1.6
TG50NW324	651720	307280	0.9
TG50NW326	651710	306530	1.6
TG50NW328	652180	306530	1.2
TG50NW329	652180	306490	1.3
TG50NW330	652190	306490	1.3

TG50NW333	652150	308050	1.76
TG50NW334	652160	308120	1.28
TG50NW335	652130	308120	2.47
TG50NW336	652200	308080	1.83
TG50NW337	652120	306630	0.46
TG50NW338	652110	306620	0.61
TG50NW339	652110	306600	0.46
TG50NW340	652130	306580	0.23
TG50NW385	652050	305620	0.21
TG50NW39	652050	305590	0.38
TG50NW4	652250	305990	4
TG50NW40	652016	305570	0.3
TG50NW403	651724	308200	0.78
TG50NW404	651756	308299	1.13
TG50NW405	651849	308413	0.68
TG50NW406	651499	306984	2.84
TG50NW407	651476	307222	1.73
TG50NW411	651496	306982	2.875
TG50NW412	651481	307158	1.86
TG50NW413	651462	307372	1.92
TG50NW42	652048	305625	0.21
TG50NW422	651731	308188	0.75
TG50NW423	651727	308194	0.81
TG50NW424	651779	308303	0.53
TG50NW425	651796	308284	1.57
TG50NW426	651823	308449	0.89
TG50NW427	651797	308408	0.92
TG50NW428	652054	305931	0.255
TG50NW430	652054	306020	1.59
TG50NW431	651938	306226	0.53
TG50NW432	651811	306391	0.02
TG50NW433	651670	306508	0.476
TG50NW434	651564	306705	0.72
TG50NW439	651756	308317	0.91
TG50NW440	651817	308380	1.18
TG50NW441	651813	308409	1.05
TG50NW442	651870	308460	1.29
TG50NW443	651505	306933	3.14
TG50NW444	651506	306910	2.88
TG50NW445	651483	307162	2.48
TG50NW456	651810	308450	0.95
TG50NW458	651520	306830	2.34
TG50NW459	651530	306700	0.08
TG50NW460	651520	306660	-0.406

TG50NW461	651560	306610	-0.03
TG50NW462	651570	306600	0.034
TG50NW463	651580	306580	-0.026
TG50NW464	651570	306580	-0.286
TG50NW465	651580	306590	-0.16
TG50NW466	652050	306090	0.435
TG50NW467	652010	306060	0.521
TG50NW468	652020	306070	0.58
TG50NW469	651850	308400	0.48
TG50NW470	651880	308480	1.34
TG50NW471	651810	308500	1.24
TG50NW473	651710	308180	0.96
TG50NW474	651690	308190	0.87
TG50NW479	651670	308090	-1.63
TG50NW481	651640	308050	-1.39
TG50NW482	651640	308040	-4.99
TG50NW483	651620	308040	-3.71
TG50NW484	651630	308020	-5.01
TG50NW485	651610	308020	-5.07
TG50NW486	651620	308010	-4.67
TG50NW487	651610	308020	-4.11
TG50NW488	651620	308000	-2.82
TG50NW489	651610	307990	-0.85
TG50NW544	651730	308200	0.78
TG50NW554	651730	308200	0.78
TG50NW555	652040	308040	3.11
TG50NW556	652020	307730	1.73
TG50NW557	652020	307730	1.73
TG50NW558	652020	307730	1.73
TG50NW559	651970	307630	2.32
TG50NW560	651910	307690	2.07
TG50NW593	652270	307870	6.62
TG50NW594	652270	307870	6.49
TG50NW595	652270	307870	6.6
TG50NW596	652270	307870	6.6
TG50NW597	652270	307870	6.6
TG50NW598	652270	307870	6.7
TG50NW599	652270	307870	6.34
TG50NW600	652270	307870	6.7
TG50NW601	652270	307870	6.7
TG50NW602	652270	307870	6.7
TG50NW603	651820	308300	1.78
TG50NW604	651910	308260	1.05
TG50NW605	651780	308220	1.44

TG50NW606	651890	308330	0
TG50NW623	651330	306710	0
TG50NW627	651430	306140	0
TG50NW628	651430	306290	0
TG50NW638	651430	307040	0
TG50NW684	651600	306200	0
TG50NW693	651850	309040	0
TG50NW710	651730	308201	0
TG50NW713	651730	308210	0
TG50NW714	651630	308520	0
TG50NW715	651610	308220	0
TG50NW716	651670	308280	0
TG50NW718	651550	308210	0
TG50NW719	651410	308250	0
TG50NW745	651570	308200	-5.2
TG50NW746	651500	308190	-0.52
TG50NW779	651294	308891	0.16
TG50NW780	651491	308851	0.67
TG50NW781	651638	308719	1.18
TG50NW8/A	652190	308100	1.4
TG50NW8/B	652190	308100	1.7
TG50NW8/C	652190	308100	1.8
TG50NW9	652280	308190	3.8
TG50NW948	651770	307080	0.3
TG50NW949	651680	306860	0.7
TG50NW950	651700	306930	0.5
TG50NW951	651550	306900	0.6
TG50NW952	651530	307000	0.5
TG50NW953	651620	306990	0.5
TG50NW954	651560	307110	0.4
TG50NW955	651640	307060	0.4
TG50NW956	651620	307160	0.3
TG50NW957	651710	307180	0.3
TG50NW981	652360	306890	0
TG50NW982	652360	306890	0
TG50NW983	652370	306880	0
TG50NW984	652380	306790	0
TG50NW985	652360	306790	0
TG50NW996	652700	305950	2
TG50NW998	652590	305890	1.7
TG50NW999	652590	306890	4.4
TG50SW1	652970	302640	15.24
TG50SW118	650360	300540	1.83
TG50SW119	650960	300490	0

TG50SW180	653243	301118	2
TG50SW181	653292	300869	2.13
TG50SW182	653349	300621	2.74
TG50SW183	653261	301119	0.15
TG50SW184	653312	300873	0.61
TG50SW185	653369	300627	1.52
TG50SW190	650300	300500	0
TG50SW191	650900	300400	0
TG50SW2A	652600	304300	5.79
TG50SW2B	652600	304300	5.8
TG50SW2C	652600	304300	6.27
TG50SW39	653140	303640	2.7
TG50SW4	651030	304080	14.63
TG50SW42	652940	303080	9.64
TG50SW43	652930	302910	15.41
TG50SW44	652990	302730	15.26
TG50SW45	653000	302650	15.47
TG50SW5	650930	304430	12.19
TG50SW7	650950	303970	10.67
Thurlton Marshes 1	644645	299815	0.55
Thurlton Marshes 2	644645	299815	0.55
Thurlton Marshes 3	644645	299815	0.55
TM39SE17	639970	293200	24.99
TM39SE30	639900	299010	0
TM39SE97	639940	290150	3.8
TM48NW6	641570	298480	10.25
TM49NE1	645420	299200	0
TM49NE12	643660	299000	14.9
TM49NE14	648510	297390	0
TM49NE17	648520	297030	0
TM49NE18	645850	299410	3.66
TM49NE19	645880	298220	1
TM49NE20	645660	296770	1
TM49NE21	645660	295080	6.78
TM49NE22	646870	298280	18.18
TM49NE24	649260	297150	15.14
TM49NE26	648140	299460	19
TM49NE27 -- UEA	647200	297110	-1.1
TM49NE28 -- UEA	647070	296980	-1.1
TM49NE29 -- UEA	646970	296880	-1
TM49NE30 -- UEA	646890	296770	-1
TM49NE31 -- UEA	646800	296700	-1
TM49NE32	646670	296580	0
TM49NE33	646510	296410	0

TM49NE34	646410	296310	0
TM49NE35	646300	296200	0
TM49NE36	646220	296120	0
TM49NE37	646120	296020	0
TM49NE38	646070	295960	0
TM49NE39	646020	295910	0
TM49NE4	645270	299010	2.44
TM49NE40	646630	296570	-1
TM49NE42	648180	297620	16.76
TM49NE44	640000	290000	1.75
TM49NE45	645620	299270	0.31
TM49NE46	645540	299070	0.38
TM49NE48	648520	297030	15.24
TM49NE52	646300	298630	16
TM49NE56	648106	295527	1.76
TM49NE57	640000	290000	1.06
TM49NE58	640000	290000	1.41
TM49NE59	640000	290000	1.23
TM49NE7	645300	299070	1.7
TM49NE8	645320	299050	0.46
TM49NE9	645300	299130	29.26
TM49NW1	641220	299190	14.02
TM49NW10	641310	298590	2.45
TM49NW11	642400	297400	20.6
TM49NW12	642090	297520	16.76
TM49NW13	644640	299810	1.3
TM49NW14	641480	295420	30.48
TM49NW15	641210	295010	32.2
TM49NW17	642280	295490	32
TM49NW18	641730	295390	30.48
TM49NW19	644040	296830	11
TM49NW2	641190	298630	6.74
TM49NW20	640080	298070	22.77
TM49NW22	642510	297460	20.94
TM49NW23	643010	295700	26.9
TM49NW25	642570	299430	0
TM49NW26	642590	299580	0
TM49NW27	642620	299700	0
TM49NW28	642640	299790	0
TM49NW29	642650	299860	-0.3
TM49NW3	641320	298510	3.1
TM49NW30	642670	299930	-0.3
TM49NW4	641380	298480	5.3
TM49NW44	642620	295330	30.8

TM49NW5	641350	298410	12.3
TM49NW53	644500	296300	13.4
TM49NW54	644600	296300	10.8
TM49NW55	644700	296200	11
TM49NW56	644700	296200	11
TM49NW57	644640	299810	1.3
TM49NW58	644640	299890	1.3
TM49NW6	641570	298480	10.25
TM49NW63	644000	296000	3.75
TM49NW64	644980	299460	3.12
TM49NW7	641350	298520	1.2
TM49NW8	641370	298530	1
TM49NW9	641340	298560	2
TM49SE1	646510	293510	24.9
TM49SE10	645950	294300	18.4
TM49SE13	646800	292700	0
TM49SE14	646600	292700	0
TM49SE15	646500	292500	12.8
TM49SE2	649170	293420	2
TM49SE4	640000	290000	14
TM49SE44	640000	290000	0
TM49SE48	649462	294600	1.61
TM49SE6	640000	290000	15.85
TM49SE7	646410	292620	14.1
TM49SE8	646440	293260	22.8
TM49SE9	648310	293030	14.41
TM49SW1	641020	291660	0
TM49SW10	641680	291350	0.13
TM49SW100	643120	291070	0.28
TM49SW101	643200	291050	0.65
TM49SW102	643270	291030	0.81
TM49SW104	643490	290960	0.74
TM49SW105	643590	290930	0.38
TM49SW106	643710	290900	0.4
TM49SW107	643780	290870	0.06
TM49SW108	643970	290790	0.71
TM49SW109	644140	290710	0.51
TM49SW110	644240	290660	0.57
TM49SW111	644350	290610	0.08
TM49SW112	644430	290570	1.09
TM49SW113	644500	290530	8.8
TM49SW114	644580	290430	5.4
TM49SW115	644590	290420	2.26
TM49SW116	644620	290400	11.89

TM49SW117	644600	290410	5.87
TM49SW118	644670	290410	12.81
TM49SW119	644630	290400	12.36
TM49SW12	642070	291280	0.93
TM49SW120	644600	290390	11.74
TM49SW121	644600	290380	11.76
TM49SW122	644680	290340	9.94
TM49SW123	644900	290140	10.4
TM49SW124	644890	290110	10.61
TM49SW125	644870	290100	10.51
TM49SW126	644920	290050	9.91
TM49SW13	642340	291230	1.31
TM49SW132	642580	290440	0
TM49SW133	640670	294870	28.91
TM49SW134	640090	293370	26.93
TM49SW135	641790	294230	21.44
TM49SW136	643980	293410	26.85
TM49SW137	644120	294410	19.67
TM49SW138	644100	293580	12.94
TM49SW139	640200	290700	2.9
TM49SW14	642570	291240	0.64
TM49SW140	640290	290880	2.6
TM49SW141	640240	291050	2.1
TM49SW142	640360	291030	2.5
TM49SW143	640440	290860	3
TM49SW144	640320	290720	2.8
TM49SW145	640290	290570	1.5
TM49SW146	640370	290250	2.8
TM49SW147	640250	290370	1
TM49SW148	640260	290250	2.4
TM49SW149	640130	290540	1.8
TM49SW15	642760	290950	1.52
TM49SW150	640040	290720	3.3
TM49SW151	640120	290890	2.8
TM49SW16	642940	291130	1.18
TM49SW17	642980	290610	0.68
TM49SW178	641380	292300	10.97
TM49SW18	643160	291050	0.45
TM49SW180	644000	293520	12.8
TM49SW181	644040	293490	14.8
TM49SW182	643980	293440	16
TM49SW183	643940	293420	15
TM49SW184	644080	293410	15
TM49SW185	644030	293390	15

TM49SW186	643950	293360	16
TM49SW187	644110	293340	15
TM49SW188	644070	293340	15
TM49SW189	643960	293310	15
TM49SW19	643440	290020	1.29
TM49SW190	643990	293260	14.4
TM49SW191	644030	293270	16
TM49SW192	644110	293310	15
TM49SW2	642640	290970	15
TM49SW20	643670	290270	0.5
TM49SW205	642710	290210	2.3
TM49SW206	642730	290290	2.4
TM49SW207	642760	290330	1.2
TM49SW208	642800	290270	0.5
TM49SW21	643940	290790	0.2
TM49SW22	644460	290510	8.48
TM49SW23	644530	290420	7.31
TM49SW24	644660	290230	10.9
TM49SW25	644720	290120	10.3
TM49SW26	641900	290190	5.2
TM49SW27	641920	290240	4.8
TM49SW28	641910	290190	6.1
TM49SW29	641920	290380	3
TM49SW3	642910	291150	1.2
TM49SW30	642600	290370	4.3
TM49SW31	642140	291030	1.7
TM49SW32	642040	293440	28
TM49SW33	641100	291700	1.6
TM49SW34	641020	292310	8.4
TM49SW35	642330	290650	6.1
TM49SW36	644310	290230	11
TM49SW37	642360	290280	10.36
TM49SW38	643270	294630	28.04
TM49SW39	640620	292790	22.1
TM49SW40	640440	294890	28.96
TM49SW41	644590	294420	16.76
TM49SW42	644590	294420	15.2
TM49SW43	640220	293480	26
TM49SW44	640150	293000	14
TM49SW45	643270	293770	22.25
TM49SW46	644170	294330	19.2
TM49SW50	641120	292080	11
TM49SW51	641180	292020	11
TM49SW52	641150	292000	11

TM49SW53	641190	291980	11
TM49SW54	641240	291910	7.6
TM49SW55	641300	291820	4.4
TM49SW56	641360	291760	4
TM49SW57	641450	291700	2.9
TM49SW58	641470	291700	2.9
TM49SW59	641460	291690	2.9
TM49SW6	643540	290220	1
TM49SW60	641560	291660	3.3
TM49SW61	641630	291600	3
TM49SW62	641660	291550	2.8
TM49SW63	641670	291540	2.9
TM49SW64	641660	291530	2.8
TM49SW65	641800	291510	0
TM49SW66	641900	291470	0
TM49SW67	641990	291470	0
TM49SW68	642050	291420	0
TM49SW69	642960	291400	0.6
TM49SW7	644110	290610	2.4
TM49SW70	642060	291440	2.2
TM49SW71	642070	291420	2
TM49SW72	642140	291380	1.8
TM49SW73	642140	291410	1.8
TM49SW74	642150	291400	1.6
TM49SW75	642170	291400	1.6
TM49SW76	642160	291400	1.6
TM49SW77	642190	291370	1.5
TM49SW78	642250	291400	1.2
TM49SW79	642300	291320	0.8
TM49SW8	644400	290370	10.8
TM49SW80	642340	291350	0.7
TM49SW81	642350	291260	0.6
TM49SW82	642450	291240	0.8
TM49SW83	642520	291230	0.9
TM49SW84	642620	291230	1.1
TM49SW85	642720	291170	1.2
TM49SW86	642820	291150	1.2
TM49SW87	642910	291120	1.3
TM49SW88	642920	291130	1.3
TM49SW89	642460	291140	0.9
TM49SW9	644700	290110	9.25
TM49SW90	642520	291040	0.9
TM49SW91	642550	290900	0.9
TM49SW92	642570	290810	0.9

TM49SW93	642550	290710	1.5
TM49SW94	642550	290620	2.6
TM49SW95	642550	290510	4.7
TM49SW96	642960	291110	1.5
TM49SW97	642970	291110	1.7
TM49SW98	642990	291120	2.2
TM49SW99	643030	291100	3.1
TM50SW41	653910	303290	15.63
TM58NW111	653090	289470	0
TM58NW112	653200	289470	0
TM58NW113	653200	289410	0
TM59NE1	655030	295360	5.76
TM59NW1	652810	295700	18.72
TM59NW11	654970	295250	6.04
TM59NW112	653728	299407	2.5
TM59NW113	653813	299169	3
TM59NW114	653896	298940	3
TM59NW115	653743	299413	1.22
TM59NW116	653830	299174	1.37
TM59NW117	653915	298948	1.37
TM59NW119	653600	295080	23
TM59NW12	653900	299030	-0.7
TM59NW120	653580	295090	23
TM59NW121	653560	295080	23
TM59NW123	653580	295070	23
TM59NW125	652320	298780	13.9
TM59NW13	653690	299700	-0.7
TM59NW133	653640	296090	10.1
TM59NW134	653600	296080	10.1
TM59NW135	653550	296070	9.8
TM59NW136	653570	296030	10.7
TM59NW137	653610	296040	14.1
TM59NW138	653660	296020	15.1
TM59NW139	653610	295920	16.1
TM59NW14	654060	298690	-0.8
TM59NW140	653520	295890	12.4
TM59NW141	653460	295870	9
TM59NW142	653490	295960	9
TM59NW143	653510	296060	8.5
TM59NW144	653560	295950	14.9
TM59NW145	653540	295880	14.9
TM59NW146	653620	295900	16.3
TM59NW147	653620	295950	15.9
TM59NW148	653630	296020	14.1

TM59NW149	653630	296080	10.47
TM59NW15	654240	298060	5
TM59NW150	653690	296100	10.2
TM59NW151	653670	296060	14.9
TM59NW152	653700	296050	16
TM59NW153	653670	296000	16
TM59NW154	653720	295990	15.9
TM59NW155	653670	295950	16.8
TM59NW156	653620	296020	14
TM59NW157	653620	296040	13
TM59NW158	653580	296000	12.5
TM59NW159	653610	296060	12
TM59NW16	654330	297840	1.3
TM59NW160	653590	296010	13.5
TM59NW161	653550	295990	13
TM59NW162	653530	296000	11.8
TM59NW163	653540	296030	11.3
TM59NW164	654560	296950	21.8
TM59NW165	654600	296900	21.08
TM59NW166	654590	296980	2.3
TM59NW167	654900	295330	19.6
TM59NW17	650510	299940	14.2
TM59NW18	650570	299380	8.3
TM59NW19	650280	298690	19.5
TM59NW20	650800	296150	8
TM59NW21	651720	299010	8.9
TM59NW22	651710	298330	19.6
TM59NW23	651000	298170	15.2
TM59NW24	651330	296630	10
TM59NW26	652590	297550	19
TM59NW27	652100	296720	17.1
TM59NW29	654610	296590	23
TM59NW3	654270	295750	22.38
TM59NW32	652700	299200	-0.45
TM59NW33	652400	299200	19.11
TM59NW34	652700	299200	-0.45
TM59NW35	652400	299200	16.03
TM59NW36	652400	299200	16.38
TM59NW37	652700	299200	19.1
TM59NW38	652700	299200	16.4
TM59NW39	652700	299200	16.05
TM59NW4	653400	296110	6.47
TM59NW40	654400	296600	15.9
TM59NW48	653065	295003	23.17

TM59NW49	653061	295116	21.4
TM59NW5	653280	296610	17.15
TM59NW50	653040	295221	18.64
TM59NW51	653009	295333	18.13
TM59NW52	652993	295408	18.59
TM59NW53	653006	295523	18.75
TM59NW54	653016	295630	19.27
TM59NW55	653050	295710	19.05
TM59NW56	653052	295823	18.34
TM59NW57	653118	295911	15.95
TM59NW58	653086	295967	16.06
TM59NW59	653124	295958	13.74
TM59NW6	654030	296800	18.39
TM59NW60	653158	295959	13.24
TM59NW61	653128	296010	11.23
TM59NW62	653178	296109	7.22
TM59NW63	653168	296181	5.72
TM59NW64	653204	296208	5.44
TM59NW65	653194	296248	6.47
TM59NW66	653192	296286	9.42
TM59NW67	653211	296338	13.75
TM59NW68	653225	296393	14.62
TM59NW69	653226	296531	17.39
TM59NW7	654010	296280	10.28
TM59NW70	653231	296573	17.58
TM59NW71	653210	296663	17.26
TM59NW72	653184	296755	18.29
TM59NW73	653167	296808	18.17
TM59NW74	653015	295655	19.4
TM59NW75	653012	295753	19.35
TM59NW76	653097	295858	17.72
TM59NW77	653087	295833	15.98
TM59NW8	654610	296360	15.29
TM59NW9	654730	295680	24.06
TM59NW94	654180	297440	17.3
TM59NW95	654210	297440	17.4
TM59SE1	655220	294560	4.97
TM59SE10	655230	293620	7.62
TM59SE11	655300	293940	3.05
TM59SE12	655350	293980	3.05
TM59SE13	655110	293170	5.5
TM59SE14	655120	293170	5.1
TM59SE15	655110	293130	5
TM59SE16	655060	293110	5.1

TM59SE17	655100	293150	5.4
TM59SE18	655020	293740	18.5
TM59SE19	655050	293720	18.1
TM59SE2	655290	294040	10.53
TM59SE20	655020	293770	18.5
TM59SE21	655040	293790	19.1
TM59SE22	655190	293110	2.7
TM59SE23	655110	293300	8.5
TM59SE24	655110	293300	8.5
TM59SE25	655110	293300	8.5
TM59SE26	655040	293810	19.5
TM59SE27	655070	293810	19.4
TM59SE28	655060	293800	19.2
TM59SE29	655110	293780	18.7
TM59SE3	655470	293700	3.75
TM59SE30	655320	293020	2.5
TM59SE31	655130	292810	13
TM59SE32	655250	293050	17.5
TM59SE33	655280	293200	13.5
TM59SE34	655480	293090	14.2
TM59SE4	655010	293750	18.14
TM59SE5	655050	293730	18.59
TM59SE58	655550	293710	3.96
TM59SE6	655250	293700	5.8
TM59SE7	655260	293640	3.96
TM59SE8	655190	293600	6.4
TM59SE9	655260	293650	3.96
TM59SW1	651680	293110	0
TM59SW100	653862	292607	3.72
TM59SW101	653837	292626	3.46
TM59SW102	653852	292654	3.3
TM59SW103	653879	292697	3.07
TM59SW104	653856	292722	2.93
TM59SW105	653878	292717	2.96
TM59SW106	653891	292714	2.77
TM59SW107	653851	292745	-6.06
TM59SW108	653883	292739	-4.2
TM59SW109	653908	292732	-4.12
TM59SW110	653874	292755	-5.5
TM59SW111	653901	292747	-5.15
TM59SW112	653882	292795	-6.07
TM59SW113	653931	292799	-6.47
TM59SW114	653871	292814	-6.06
TM59SW115	653900	292806	-5.65

TM59SW116	653913	292786	-5.42
TM59SW117	653880	292843	2.93
TM59SW118	653905	292837	2.97
TM59SW119	653931	292831	2.95
TM59SW120	653912	292848	3.04
TM59SW121	653913	292488	3.04
TM59SW122	653892	292887	2.74
TM59SW123	653892	292887	2.74
TM59SW124	653918	292877	2
TM59SW125	653936	292871	2.88
TM59SW126	653920	292892	2.7
TM59SW127	653900	292926	2.41
TM59SW128	653999	292888	2.49
TM59SW129	653944	292924	2.37
TM59SW130	653996	292966	4.33
TM59SW131	653921	292960	2.75
TM59SW132	653918	292993	2.71
TM59SW133	653882	292963	2.47
TM59SW134	653847	292974	2.47
TM59SW135	653894	293020	4.28
TM59SW136	653836	293018	2.64
TM59SW137	653690	293040	4.54
TM59SW138	653645	293064	4.7
TM59SW139	653597	293103	5.2
TM59SW140	653532	293159	4.48
TM59SW141	653558	293071	3.77
TM59SW142	653514	293114	3.43
TM59SW143	653424	293165	4.39
TM59SW144	653344	293272	3.87
TM59SW145	653288	293393	3.61
TM59SW146	653257	293443	4.75
TM59SW147	653241	293535	7.9
TM59SW148	653229	293592	11.29
TM59SW149	653196	293636	13.21
TM59SW151	653249	293708	17.64
TM59SW152	653103	293681	17.07
TM59SW153	653140	293700	17.4
TM59SW154	653169	293701	17.91
TM59SW155	653225	293715	17.71
TM59SW156	653295	293724	19.26
TM59SW157	653138	293723	18.73
TM59SW158	653160	293735	18.73
TM59SW159	653225	293746	20.59
TM59SW16	652560	293750	20.59

TM59SW160	653279	293743	20.75
TM59SW161	653182	293766	20.87
TM59SW162	653220	293762	20.56
TM59SW163	653145	293774	20.9
TM59SW164	653197	293782	21
TM59SW165	653165	293813	20.64
TM59SW166	653158	293846	20.53
TM59SW167	653156	293965	18.51
TM59SW168	653149	294064	19.08
TM59SW169	653122	294131	19.32
TM59SW170	653154	294141	19
TM59SW171	653149	294222	19.17
TM59SW172	653189	294317	17.58
TM59SW173	653158	294358	16.84
TM59SW174	653184	294342	17.25
TM59SW175	653216	294354	17.82
TM59SW176	653164	294404	16.96
TM59SW177	653163	294517	19.86
TM59SW178	653128	294637	22.53
TM59SW179	653105	294726	22.48
TM59SW180	653066	294818	21.87
TM59SW181	653037	294900	23.29
TM59SW182	653081	294910	23.7
TM59SW193	653622	293088	5.22
TM59SW194	653251	293495	6.22
TM59SW195	653203	293593	11.3
TM59SW196	653215	293631	13.45
TM59SW197	653203	293669	15.59
TM59SW198	653238	293712	17.72
TM59SW199	653196	293721	19.83
TM59SW2	654630	292660	0
TM59SW200	653143	293757	20.62
TM59SW201	653171	293782	20.44
TM59SW202	653187	293792	20.92
TM59SW203	653146	293816	20.81
TM59SW204	653171	293842	19.38
TM59SW205	653158	293887	18.66
TM59SW206	653156	293939	17.9
TM59SW207	653153	293997	17.9
TM59SW208	653147	294088	18.92
TM59SW209	653905	292251	3.1
TM59SW21	653550	293140	3.67
TM59SW210	653912	292251	3.1
TM59SW211	653956	292296	4.38

TM59SW226	654620	292580	2.3
TM59SW227	654630	292600	2.5
TM59SW228	654640	292580	2.4
TM59SW229	654640	292560	2.4
TM59SW230	654660	292590	2.9
TM59SW270	654080	290940	12.2
TM59SW271	654080	290840	9.3
TM59SW273	652750	290840	4.8
TM59SW274	652780	290890	4.8
TM59SW275	652840	290930	3.7
TM59SW276	652800	290950	3.7
TM59SW277	652840	290940	3.2
TM59SW278	652800	290980	3.1
TM59SW279	652860	290980	3
TM59SW280	652860	291020	3
TM59SW284	652800	293780	14.9
TM59SW285	652830	293790	14.8
TM59SW286	652840	293670	16
TM59SW287	652840	293590	15.5
TM59SW288	652860	293650	16
TM59SW289	653930	292620	3.5
TM59SW290	653920	292680	3.4
TM59SW291	653960	292670	3.5
TM59SW292	654010	292650	1.3
TM59SW293	654020	292620	0
TM59SW294	653960	292640	3
TM59SW295	654910	293180	5.8
TM59SW296	654860	293100	4.8
TM59SW297	654870	293150	5.4
TM59SW298	654850	293160	5.5
TM59SW299	654880	293110	4.9
TM59SW300	654850	293120	5.2
TM59SW301	654860	293080	4.4
TM59SW302	654830	293100	4.8
TM59SW303	654780	293100	4.8
TM59SW304	654790	293130	5
TM59SW309	652720	292000	10.7
TM59SW311	652730	292080	10.3
TM59SW314	654210	292810	2.96
TM59SW315	654190	292810	3.24
TM59SW316	654200	292790	3.21
TM59SW317	654210	292780	2.93
TM59SW318	654190	292810	2.2
TM59SW319	654230	292790	3.34

TM59SW320	652450	292880	0
TM59SW322	654560	292150	4.9
TM59SW357	654120	293970	18
TM59SW367	654410	293910	0
TM59SW369	655420	293950	0
TM59SW370	654360	293930	0
TM59SW377	654380	294000	0
TM59SW378	654390	294030	0
TM59SW379	654370	294030	0
TM59SW407	654350	293970	0
TM59SW465	654360	291660	0
TM59SW469	652090	292770	-1.24
TM59SW471	652100	292690	-0.99
TM59SW472	652090	292790	-2.64
TM59SW50	654160	291170	15.6
TM59SW51	654200	291150	15.2
TM59SW52	654230	291150	15.3
TM59SW545	652990	290780	0
TM59SW55	653100	293900	0
TM59SW58	652750	292220	0
TM59SW598	654700	292790	2.3
TM59SW599	654730	292790	3.2
TM59SW60	654820	293130	0
TM59SW600	654690	292770	1
TM59SW601	654720	292770	2.5
TM59SW61	654610	293090	0
TM59SW613	652110	290260	0
TM59SW614	652090	290260	0
TM59SW62	654000	292500	0
TM59SW650	653520	294260	13.5
TM59SW651	653560	294210	13.5
TM59SW652	653510	294220	13.5
TM59SW653	653540	294230	6
TM59SW654	653530	294210	2
TM59SW655	653520	294230	23.4
TM59SW656	653530	294220	23.5
TM59SW657	653540	294210	23.1
TM59SW658	653560	294210	23.1
TM59SW660	653530	294240	24
TM59SW661	653520	294240	23.8
TM59SW662	653520	294240	24
TM59SW663	653530	294250	24
TM59SW664	653530	294260	24
TM59SW665	653540	294260	24

TM59SW666	653540	294290	24.7
TM59SW667	653550	294310	25.5
TM59SW668	653540	294310	25.1
TM59SW669	653540	294300	25.1
TM59SW670	653530	294280	24.4
TM59SW671	652890	291610	19.7
TM59SW68	654380	293910	0
TM59SW7	652660	294430	0
TM59SW73	652790	290776	2.14
TM59SW74	652850	290767	2.74
TM59SW75	652941	290927	1.41
TM59SW76	652968	291022	1.65
TM59SW77	653045	291104	1.5
TM59SW78	653068	291168	2.05
TM59SW79	653161	291239	1.51
TM59SW8	652730	293930	0
TM59SW80	653221	291336	1.1
TM59SW81	653278	291422	1.08
TM59SW82	653338	291510	2.08
TM59SW83	653420	291525	1.81
TM59SW84	653419	291629	1.22
TM59SW85	653471	291644	1.12
TM59SW86	653522	291764	1.02
TM59SW87	653522	291764	0.69
TM59SW88	653542	291852	0.54
TM59SW89	653588	291941	0.52
TM59SW90	653668	292084	1.55
TM59SW91	653748	292152	1.59
TM59SW92	653831	292203	3.35
TM59SW93	653948	292251	3.28
TM59SW94	653952	292308	2.77
TM59SW95	654004	292307	2.94
TM59SW96	653902	292378	3.91
TM59SW97	653880	292391	3.23
VC1 -- Wessex	796098	287130	-67.61
VC2 -- Wessex	795735	287651	-27.8
VC3 -- Wessex	796221	287897	-31.81
VC5 - Wessex	796256	287776	-32.37
VC6 -- Wessex	796169	287337	-30.18
VC7 -- Wessex	796031	287329	-27.27
VC7i -- Wessex	796031	287329	-27.36
VC8 -- Wessex	795864	287575	-29
VC9 -- Wessex	795939	287372	-28.09

Appendix B: Boreholes: Stratigraphic Interpretations

Borehole ID	From (m OD)	To (m OD)	Stratigraphy
Alder Carr 1	0	0.4	Upper Peat (Breydon Formation)
Alder Carr 1	0.4	0.85	Upper Clay (Breydon Formation)
Alder Carr 2	0	1	Upper Clay (Breydon Formation)
Alder Carr 2	1	6.4	Middle Peat (Breydon Formation)
Alder Carr 2	6.4	6.5	Lower Clay (Breydon Formation)
Alder Carr 3	0	0.2	Upper Peat (Breydon Formation)
Alder Carr 3	0.2	0.4	Upper Clay (Breydon Formation)
Alder Carr 3	0.4	6.55	Middle Peat (Breydon Formation)
Alder Carr 3	6.55	6.7	Lower Clay (Breydon Formation)
Alder Carr 4	0	0.1	Upper Peat (Breydon Formation)
Alder Carr 4	0.1	0.45	Upper Clay (Breydon Formation)
Alder Carr 4	0.45	7.05	Middle Peat (Breydon Formation)
Alder Carr 4	7.05	7.6	Lower Clay (Breydon Formation)
Alder Carr 5	0	0.2	Topsoil or Made Ground
Alder Carr 5	0.2	0.7	Upper Peat (Breydon Formation)
Alder Carr 5	0.7	1.5	Upper Clay (Breydon Formation)
Alder Carr 5	1.5	3.5	Middle Peat (Breydon Formation)
Alder Carr 6	0	1	Upper Clay (Breydon Formation)
Alder Carr 6	1	2	Middle Peat (Breydon Formation)
Alder Carr 7	0	6.1	Middle Peat (Breydon Formation)
Alder Carr 7	6.1	6.25	Lower Clay (Breydon Formation)
AWA Bores - R. Yare 6/4	0	2.6	Topsoil or Made Ground
AWA Bores - R. Yare 6/4	2.6	13	Crag (Norwich Crag and Red Crag)
AWA Bores - R. Yare 6/5	0	2.7	Topsoil or Made Ground
AWA Bores - R. Yare 6/5	2.7	21	Crag (Norwich Crag and Red Crag)
AWA Bores - R. Yare 6/6	0	2.45	Topsoil or Made Ground
AWA Bores - R. Yare 6/6	2.45	19.9	Crag (Norwich Crag and Red Crag)
Beccles By Pass - river crossing 15/2/B	0	0.42	Middle Peat (Breydon Formation)
Beccles By Pass - river crossing 15/2/B	0.42	4.9	Lower Clay (Breydon Formation)
Beccles By Pass - river crossing 15/2/B	4.9	5.05	Crag (Norwich Crag and Red Crag)
Beccles By Pass - river crossing 16/2/B	0	0.5	Upper Clay (Breydon Formation)
Beccles By Pass - river crossing 16/2/B	0.5	4.2	Middle Peat (Breydon Formation)
Beccles By Pass - river crossing 16/2/B	4.2	4.4	Lower Clay (Breydon Formation)
Beccles By Pass - river crossing 16/3/B	0	1.6	Topsoil or Made Ground

Beccles By Pass - river crossing 16/3/B	1.6	2	Upper Peat (Breydon Formation)
Beccles By Pass - river crossing 16/3/B	2	5.6	Upper Clay (Breydon Formation)
Beccles By Pass - river crossing 16/3/B	5.6	7.6	Middle Peat (Breydon Formation)
Beccles By Pass - river crossing 16/3/B	7.6	7.8	Lower Clay (Breydon Formation)
Beccles By Pass - river crossing 16/4/B 1	0	1.8	Topsoil or Made Ground
Beccles By Pass - river crossing 16/4/B 1	1.8	3.7	Upper Peat (Breydon Formation)
Beccles By Pass - river crossing 16/4/B 1	3.7	5.95	Upper Clay (Breydon Formation)
Beccles By Pass - river crossing 16/4/B 1	5.95	8.1	Middle Peat (Breydon Formation)
Beccles By Pass - river crossing 16/4/B 1	8.1	8.3	Lower Clay (Breydon Formation)
Beccles By Pass - river crossing 16/4/B 2	0	1.8	Topsoil or Made Ground
Beccles By Pass - river crossing 16/4/B 2	1.8	3.8	Upper Clay (Breydon Formation)
Beccles By Pass - river crossing 16/4/B 2	3.8	7.55	Middle Peat (Breydon Formation)
Beccles By Pass - river crossing 16/4/B 2	7.55	7.8	Lower Clay (Breydon Formation)
Beccles By Pass - river crossing 16/8/B	0	5.25	Middle Peat (Breydon Formation)
Beccles By Pass - river crossing 17/1/B	0	2.9	Topsoil or Made Ground
Beccles By Pass - river crossing 17/1/B	2.9	6.25	Middle Peat (Breydon Formation)
Beccles By Pass - river crossing 17/1/B	6.25	6.8	Lower Clay (Breydon Formation)
Beccles By Pass - river crossing 17/2/B	0	2.8	Topsoil or Made Ground
Beccles By Pass - river crossing 17/2/B	2.8	3	Upper Clay (Breydon Formation)
Beccles By Pass - river crossing 17/2/B	3	6.75	Middle Peat (Breydon Formation)
Beccles By Pass - river crossing 17/2/B	6.75	7	Lower Clay (Breydon Formation)
Beccles By Pass - river crossing 17/2/T	0	1.45	Topsoil or Made Ground
Beccles By Pass - river crossing 17/2/T	1.45	2.05	Upper Peat (Breydon Formation)
Beccles By Pass - river crossing 17/2/T	2.05	3.75	Upper Clay (Breydon Formation)

Beccles By Pass - river crossing 17/2/T	3.75	7.25	Lower Clay (Breydon Formation)
Beccles By Pass Gillingham-Beccles 16/5/B	0	3	Topsoil or Made Ground
Beccles By Pass Gillingham-Beccles 16/5/B	3	6.5	Middle Peat (Breydon Formation)
Beccles By Pass Gillingham-Beccles 16/5/B	6.5	7	Lower Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles	0	1.5	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 10/2/B	0	1.25	Upper Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 10/2/B	1.25	1.7	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 11/1/b	0	1.5	Upper Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 11/1/b	1.5	2.1	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 12/2/B	0	2.5	Upper Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 12/2/B	2.5	3	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 13/1/B	0	3.4	Upper Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 13/1/B	3.4	3.7	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 14/1/B	0	3.5	Upper Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 14/1/B	3.5	4.5	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 15/2/B	0	4	Upper Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 15/2/B	4	5.25	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 16/4/B-2	0	1.9	Topsoil or Made Ground
Beccles By Pass, Gillingham-Beccles 16/4/B-2	1.9	3.9	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 16/4/B-2	3.9	7.5	Middle Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 16/4/B-2	7.5	8	Lower Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 16/8/B	0	5.5	Upper Peat (Breydon Formation)

Beccles By Pass, Gillingham-Beccles 16/8/B	5.5	6	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 17/2/B	0	2.75	Topsoil or Made Ground
Beccles By Pass, Gillingham-Beccles 17/2/B	2.75	3	Upper Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 17/2/B	3	6.75	Middle Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 17/2/B	6.75	7.1	Lower Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 17/6/T	0	2.5	Topsoil or Made Ground
Beccles By Pass, Gillingham-Beccles 17/6/T	2.5	7.4	Middle Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 17/6/T	7.4	7.8	Lower Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 18/6/T	0	1.8	Topsoil or Made Ground
Beccles By Pass, Gillingham-Beccles 18/6/T	1.8	3.45	Middle Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 18/6/T	3.45	3.75	Lower Clay (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 9/1/B	0	0.6	Upper Peat (Breydon Formation)
Beccles By Pass, Gillingham-Beccles 9/1/B	0.6	2	Upper Clay (Breydon Formation)
Black Mill 2	0	4.5	Upper Clay (Breydon Formation)
Black Mill 2	4.5	7.9	Middle Peat (Breydon Formation)
Black Mill 2	7.9	12.5	Lower Clay (Breydon Formation)
Black Mill 2	12.5	12.7	Lower Peat (Breydon Formation)
Black Mill 2	12.7	12.75	Crag (Norwich Crag and Red Crag)
Black Mill 3	0	1.7	Upper Clay (Breydon Formation)
Black Mill 3	1.7	6.5	Middle Peat (Breydon Formation)
Black Mill 3	6.5	7.4	Lower Clay (Breydon Formation)
Black Mill 4	0	3.55	Upper Clay (Breydon Formation)
Black Mill 4	3.55	5.9	Middle Peat (Breydon Formation)
Black Mill 4	5.9	8.75	Lower Clay (Breydon Formation)
Black Mill 4	8.75	9.4	Crag (Norwich Crag and Red Crag)
Black Mill 5	0	3.6	Upper Clay (Breydon Formation)
Black Mill 5	3.6	6.15	Middle Peat (Breydon Formation)
Black Mill 5	6.15	9.05	Lower Clay (Breydon Formation)
Boundary Dyke 1	0	0.15	Topsoil or Made Ground
Boundary Dyke 1	0.15	1.3	Upper Clay (Breydon Formation)
Boundary Dyke 1	1.3	5.25	Middle Peat (Breydon Formation)
Boundary Dyke 1	5.25	5.5	Crag (Norwich Crag and Red Crag)
Boundary Dyke 2	0	0.25	Topsoil or Made Ground
Boundary Dyke 2	0.25	3.7	Upper Clay (Breydon Formation)

Boundary Dyke 2	3.7	6.95	Middle Peat (Breydon Formation)
Boundary Dyke 2	6.95	7.1	Lower Clay (Breydon Formation)
Boundary Dyke 3	0	0.2	Topsoil or Made Ground
Boundary Dyke 3	0.2	1.5	Upper Clay (Breydon Formation)
Boundary Dyke 3	1.5	7.9	Middle Peat (Breydon Formation)
Boundary Dyke 4	0	0.2	Topsoil or Made Ground
Boundary Dyke 4	0.2	3.25	Upper Clay (Breydon Formation)
Boundary Dyke 4	3.25	7	Middle Peat (Breydon Formation)
Boundary Dyke 4	7	7.25	Lower Clay (Breydon Formation)
Boundary Dyke 5	0	1.6	Middle Peat (Breydon Formation)
Boundary Dyke 5	1.6	1.9	Lowestoft Till
Boundary Dyke 6	0	4.1	Middle Peat (Breydon Formation)
Boundary Dyke 6	4.1	4.4	Lower Clay (Breydon Formation)
Boundary Dyke 7	0	0.2	Topsoil or Made Ground
Boundary Dyke 7	0.2	0.5	Upper Clay (Breydon Formation)
Boundary Dyke 7	0.5	6.75	Middle Peat (Breydon Formation)
Boundary Dyke 7	6.75	6.9	Lower Clay (Breydon Formation)
Boundary Dyke 8/2	0	0.1	Topsoil or Made Ground
Boundary Dyke 8/2	0.1	2.77	Upper Clay (Breydon Formation)
Boundary Dyke 8/2	2.77	5.63	Middle Peat (Breydon Formation)
Boundary Dyke 8/2	5.63	7.95	Lower Clay (Breydon Formation)
Boundary Dyke 8/2	7.95	9.21	Lower Peat (Breydon Formation)
Boundary Dyke 8/2	9.21	9.25	Crag (Norwich Crag and Red Crag)
Boundary Dyke 9	0	0.25	Topsoil or Made Ground
Boundary Dyke 9	0.25	3.78	Upper Clay (Breydon Formation)
Boundary Dyke 9	3.78	5.15	Middle Peat (Breydon Formation)
Caldecott Hall 1	0	0.2	Topsoil or Made Ground
Caldecott Hall 1	0.2	5.9	Upper Clay (Breydon Formation)
Caldecott Hall 1	5.9	6.25	Middle Peat (Breydon Formation)
Caldecott Hall 2	0	0.2	Topsoil or Made Ground
Caldecott Hall 2	0.2	3.42	Upper Clay (Breydon Formation)
Caldecott Hall 2	3.42	5.89	Middle Peat (Breydon Formation)
Caldecott Hall 2	5.89	16.51	Lower Clay (Breydon Formation)
Caldecott Hall 2	16.51	16.76	Lower Peat (Breydon Formation)
Caldecott Hall 3	0	0.1	Topsoil or Made Ground
Caldecott Hall 3	0.1	3.8	Upper Clay (Breydon Formation)
Caldecott Hall 3	3.8	6.3	Middle Peat (Breydon Formation)
Caldecott Hall 3	6.3	14.4	Lower Clay (Breydon Formation)
Caldecott Hall 4	0	0.15	Topsoil or Made Ground
Caldecott Hall 4	0.15	3.05	Upper Clay (Breydon Formation)
Caldecott Hall 4	3.05	5	Middle Peat (Breydon Formation)
Caldecott Hall 4	5	12	Lower Clay (Breydon Formation)
Caldecott Hall 5	0	0.15	Topsoil or Made Ground
Caldecott Hall 5	0.15	4.9	Upper Clay (Breydon Formation)

Caldecott Hall 5	4.9	6	Middle Peat (Breydon Formation)
Castle Marsh 1	0	8.75	Upper Clay (Breydon Formation)
Castle Marsh 2	0	0.2	Topsoil or Made Ground
Castle Marsh 2	0.2	3.25	Upper Clay (Breydon Formation)
Castle Marsh 2	3.25	7.25	Middle Peat (Breydon Formation)
Castle Marsh 2	7.25	7.5	Crag (Norwich Crag and Red Crag)
Castle Marsh 3	0	0.25	Topsoil or Made Ground
Castle Marsh 3	0.25	3.5	Upper Clay (Breydon Formation)
Castle Marsh 3	3.5	6.8	Middle Peat (Breydon Formation)
Castle Marsh 3	6.8	7.2	Lower Clay (Breydon Formation)
Castle Marsh 4	0	0.2	Topsoil or Made Ground
Castle Marsh 4	0.2	0.5	Upper Clay (Breydon Formation)
Castle Marsh 4	0.5	1.45	Middle Peat (Breydon Formation)
Castle Marsh 4	1.45	5.45	Lower Clay (Breydon Formation)
Castle Marsh 4	5.45	6.5	Lower Peat (Breydon Formation)
Castle Marsh 5	0	0.25	Topsoil or Made Ground
Castle Marsh 5	0.25	3	Upper Clay (Breydon Formation)
Castle Marsh 5	3	7.55	Middle Peat (Breydon Formation)
Castle Marsh 5	7.55	8	Crag (Norwich Crag and Red Crag)
Castle Marsh 6	0	0.2	Topsoil or Made Ground
Castle Marsh 6	0.2	3	Upper Clay (Breydon Formation)
Castle Marsh 6	3	8.2	Middle Peat (Breydon Formation)
Coles -- 14C Core2	0	0.4	Topsoil or Made Ground
Coles -- 14C Core2	0.4	1.05	Upper Peat (Breydon Formation)
Coles -- 14C Core2	1.05	1.5	Upper Clay (Breydon Formation)
Coles -- 14C Core2	1.5	2.6	Middle Peat (Breydon Formation)
Coles-14C Core1	0	0.3	Topsoil or Made Ground
Coles-14C Core1	0.3	2.05	Upper Clay (Breydon Formation)
Coles-14C Core1	2.05	2.18	Middle Peat (Breydon Formation)
Cove Staithe 1	0	0.25	Topsoil or Made Ground
Cove Staithe 1	0.25	6	Middle Peat (Breydon Formation)
Cove Staithe 1	6	6.5	Lower Clay (Breydon Formation)
Cove Staithe 2	0	0.15	Topsoil or Made Ground
Cove Staithe 2	0.15	1.55	Upper Clay (Breydon Formation)
Cove Staithe 2	1.55	5.75	Middle Peat (Breydon Formation)
Cove Staithe 2	5.75	5.9	Lower Clay (Breydon Formation)
Cove Staithe 3	0	0.1	Topsoil or Made Ground
Cove Staithe 3	0.1	1.05	Upper Clay (Breydon Formation)
Cove Staithe 3	1.05	5.5	Middle Peat (Breydon Formation)
Cove Staithe 3	5.5	5.6	Lower Clay (Breydon Formation)
Cove Staithe 4	0	0.12	Topsoil or Made Ground
Cove Staithe 4	0.12	5.05	Middle Peat (Breydon Formation)
Cove Staithe 4	5.05	5.3	Crag (Norwich Crag and Red Crag)
Fritton Decoy 1	0	1.29	Upper Peat (Breydon Formation)

Fritton Decoy 1	1.29	3.96	Upper Clay (Breydon Formation)
Fritton Decoy 1	3.96	7.28	Middle Peat (Breydon Formation)
Fritton Decoy 1	7.28	8.91	Lower Clay (Breydon Formation)
Fritton Decoy 1	8.91	9.74	Lower Peat (Breydon Formation)
Fritton Decoy 1	9.74	10.2	Crag (Norwich Crag and Red Crag)
Fritton Decoy 2	0	2	Upper Peat (Breydon Formation)
Fritton Decoy 2	2	3.1	Upper Clay (Breydon Formation)
Fritton Decoy 2	3.1	7.6	Middle Peat (Breydon Formation)
Fritton Decoy 2	7.6	8.3	Lower Clay (Breydon Formation)
Fritton Decoy 2	8.3	8.55	Lower Peat (Breydon Formation)
Fritton Decoy 2	8.55	8.8	Crag (Norwich Crag and Red Crag)
Fritton Decoy 3	0	0.55	Upper Peat (Breydon Formation)
Fritton Decoy 3	0.55	0.9	Upper Clay (Breydon Formation)
Fritton Decoy 3	0.9	1.75	Middle Peat (Breydon Formation)
Fritton Decoy 3	1.75	2	Crag (Norwich Crag and Red Crag)
Fritton Decoy 4	0	3.95	Middle Peat (Breydon Formation)
Fritton Decoy 4	3.95	4.25	Lower Clay (Breydon Formation)
Gillingham Marsh 1	0	0.75	Upper Peat (Breydon Formation)
Gillingham Marsh 1	0.75	1	Upper Clay (Breydon Formation)
Gillingham Marsh 1	1	2.3	Middle Peat (Breydon Formation)
Gillingham Marsh 1	2.3	3	Lower Clay (Breydon Formation)
Gillingham Marsh 2	0	0.45	Topsoil or Made Ground
Gillingham Marsh 2	0.45	3.9	Middle Peat (Breydon Formation)
Gillingham Marsh 2	3.9	4	Lower Clay (Breydon Formation)
Gillingham Marsh 3	0	0.15	Topsoil or Made Ground
Gillingham Marsh 3	0.15	2	Upper Clay (Breydon Formation)
Gillingham Marsh 3	2	4.5	Middle Peat (Breydon Formation)
Gillingham Marsh 3	4.5	4.7	Lower Clay (Breydon Formation)
Gillingham Marsh 4	0	0.15	Topsoil or Made Ground
Gillingham Marsh 4	0.15	0.22	Upper Clay (Breydon Formation)
Gillingham Marsh 4	0.22	4.2	Middle Peat (Breydon Formation)
Gillingham Marsh 5	0	0.1	Topsoil or Made Ground
Gillingham Marsh 5	0.1	0.3	Upper Clay (Breydon Formation)
Gillingham Marsh 5	0.3	2	Middle Peat (Breydon Formation)
Haddiscoe Bridge North 1	0	0.75	Topsoil or Made Ground
Haddiscoe Bridge North 1	0.75	3	Upper Clay (Breydon Formation)
Haddiscoe Bridge North 1	3	7.25	Middle Peat (Breydon Formation)
Haddiscoe Bridge North 1	7.25	13.5	Lower Clay (Breydon Formation)
Haddiscoe Bridge North 1	13.5	15.5	Crag (Norwich Crag and Red Crag)
Haddiscoe Bridge North 162/40	0	1	Topsoil or Made Ground
Haddiscoe Bridge North 162/40	1	4.1	Upper Clay (Breydon Formation)
Haddiscoe Bridge North 162/40	4.1	6	Middle Peat (Breydon Formation)

Haddiscoe Bridge North 162/40	6	16	Lower Clay (Breydon Formation)
Haddiscoe Bridge North 162/40	16	18.4	Crag (Norwich Crag and Red Crag)
Haddiscoe Bridge North 2	0	0.4	Topsoil or Made Ground
Haddiscoe Bridge North 2	0.4	3.4	Upper Clay (Breydon Formation)
Haddiscoe Bridge North 2	3.4	6.45	Middle Peat (Breydon Formation)
Haddiscoe Bridge North 2	6.45	13.75	Lower Clay (Breydon Formation)
Haddiscoe Bridge North 2	13.75	15.5	Crag (Norwich Crag and Red Crag)
Haddiscoe Bridge North 3	0	3.7	Topsoil or Made Ground
Haddiscoe Bridge North 3	3.7	4.4	Upper Clay (Breydon Formation)
Haddiscoe Bridge North 3	4.4	8	Middle Peat (Breydon Formation)
Haddiscoe Bridge North 3	8	15	Lower Clay (Breydon Formation)
Haddiscoe Bridge North 3	15	16.6	Crag (Norwich Crag and Red Crag)
Haddiscoe Bridge South 1	0	5.25	Topsoil or Made Ground
Haddiscoe Bridge South 1	5.25	7.4	Middle Peat (Breydon Formation)
Haddiscoe Bridge South 1	7.4	17.75	Lower Clay (Breydon Formation)
Haddiscoe Bridge South 1	17.75	19.4	Lower Peat (Breydon Formation)
Haddiscoe Bridge South 1	19.4	20.7	Crag (Norwich Crag and Red Crag)
Haddiscoe Bridge South 2	0	3.6	Topsoil or Made Ground
Haddiscoe Bridge South 2	3.6	5.75	Upper Clay (Breydon Formation)
Haddiscoe Bridge South 2	5.75	9.5	Middle Peat (Breydon Formation)
Haddiscoe Bridge South 2	9.5	19	Lower Clay (Breydon Formation)
Haddiscoe Bridge South 2	19	19.5	Lower Peat (Breydon Formation)
Haddiscoe Bridge South 2	19.5	22.5	Crag (Norwich Crag and Red Crag)
Haddiscoe Bridge South 3	0	9.9	Topsoil or Made Ground
Haddiscoe Bridge South 3	9.9	18.4	Lower Clay (Breydon Formation)
Haddiscoe Bridge South 3	18.4	19.5	Lower Peat (Breydon Formation)
Haddiscoe Bridge South 3	19.5	21	Crag (Norwich Crag and Red Crag)
Haddiscoe Bridge South 4	0	9.45	Topsoil or Made Ground
Haddiscoe Bridge South 4	9.45	17.6	Lower Clay (Breydon Formation)
Haddiscoe Bridge South 4	17.6	17.8	Lower Peat (Breydon Formation)
Haddiscoe Bridge South 4	17.8	19.5	Crag (Norwich Crag and Red Crag)
Haddiscoe Bridge South 5	0	0.8	Topsoil or Made Ground
Haddiscoe Bridge South 5	0.8	5.8	Upper Clay (Breydon Formation)
Haddiscoe Bridge South 5	5.8	7.4	Middle Peat (Breydon Formation)
Haddiscoe Bridge South 5	7.4	15.8	Lower Clay (Breydon Formation)
Haddiscoe Bridge South 5	15.8	16.6	Lower Peat (Breydon Formation)
Haddiscoe Bridge South 5	16.6	19	Crag (Norwich Crag and Red Crag)
Hall Quay, Yarmouth 1	0	4	Topsoil or Made Ground
Hall Quay, Yarmouth 1	4	8.6	Upper Clay (Breydon Formation)
Hall Quay, Yarmouth 1	8.6	22	Crag (Norwich Crag and Red Crag)
Hall Quay, Yarmouth 2	0	4	Topsoil or Made Ground
Hall Quay, Yarmouth 2	4	8.5	Upper Clay (Breydon Formation)
Hall Quay, Yarmouth 2	8.5	22	Crag (Norwich Crag and Red Crag)

Hall Quay, Yarmouth 3	0	4	Topsoil or Made Ground
Hall Quay, Yarmouth 3	4	9	Upper Clay (Breydon Formation)
Hall Quay, Yarmouth 3	9	20	Crag (Norwich Crag and Red Crag)
Hall Quay, Yarmouth 4	0	4	Topsoil or Made Ground
Hall Quay, Yarmouth 4	4	19.4	Upper Clay (Breydon Formation)
Hall Quay, Yarmouth 4	19.4	19.6	Lower Peat (Breydon Formation)
Hall Quay, Yarmouth 4	19.6	20	Crag (Norwich Crag and Red Crag)
Hall Quay, Yarmouth 5	0	3.9	Topsoil or Made Ground
Hall Quay, Yarmouth 5	3.9	19.5	Upper Clay (Breydon Formation)
Hall Quay, Yarmouth 5	19.5	19.9	Lower Peat (Breydon Formation)
Hall Quay, Yarmouth 5	19.9	20	Crag (Norwich Crag and Red Crag)
Hall Quay, Yarmouth 6	0	3.5	Topsoil or Made Ground
Hall Quay, Yarmouth 6	3.5	13.1	Upper Clay (Breydon Formation)
Hall Quay, Yarmouth 6	13.1	13.5	Lower Peat (Breydon Formation)
Hall Quay, Yarmouth 6	13.5	20	Crag (Norwich Crag and Red Crag)
Hall Quay, Yarmouth 7	0	4	Topsoil or Made Ground
Hall Quay, Yarmouth 7	4	12	Upper Clay (Breydon Formation)
Hall Quay, Yarmouth 7	12	20.5	Crag (Norwich Crag and Red Crag)
Hall Quay, Yarmouth 8	0	4	Topsoil or Made Ground
Hall Quay, Yarmouth 8	4	17	Upper Clay (Breydon Formation)
Hall Quay, Yarmouth 8	17	17.05	Lower Peat (Breydon Formation)
Hall Quay, Yarmouth 8	17.05	21	Crag (Norwich Crag and Red Crag)
Hall Quay, Yarmouth P2/3	0	5	Topsoil or Made Ground
Hall Quay, Yarmouth P2/3	5	15	Upper Clay (Breydon Formation)
Hall Quay, Yarmouth P2a	0	4.15	Topsoil or Made Ground
Hall Quay, Yarmouth P2a	4.15	11.8	Upper Clay (Breydon Formation)
Long Dam Level 1	0	0.25	Topsoil or Made Ground
Long Dam Level 1	0.25	2.3	Middle Peat (Breydon Formation)
Long Dam Level 1	2.3	2.5	Lower Clay (Breydon Formation)
Long Dam Level 10	0	0.25	Topsoil or Made Ground
Long Dam Level 10	0.25	2	Upper Clay (Breydon Formation)
Long Dam Level 10	2	2.25	Middle Peat (Breydon Formation)
Long Dam Level 2	0	0.2	Topsoil or Made Ground
Long Dam Level 2	0.2	1.55	Upper Clay (Breydon Formation)
Long Dam Level 2	1.55	5.6	Middle Peat (Breydon Formation)
Long Dam Level 2	5.6	5.75	Crag (Norwich Crag and Red Crag)
Long Dam Level 3	0	0.2	Topsoil or Made Ground
Long Dam Level 3	0.2	2.5	Upper Clay (Breydon Formation)
Long Dam Level 3	2.5	6.57	Middle Peat (Breydon Formation)
Long Dam Level 3	6.57	6.75	Lower Clay (Breydon Formation)
Long Dam Level 4	0	0.15	Topsoil or Made Ground
Long Dam Level 4	0.15	6.1	Middle Peat (Breydon Formation)
Long Dam Level 4	6.1	6.25	Lower Clay (Breydon Formation)
Long Dam Level 5	0	0.1	Topsoil or Made Ground

Long Dam Level 5	0.1	0.6	Upper Clay (Breydon Formation)
Long Dam Level 5	0.6	2	Middle Peat (Breydon Formation)
Long Dam Level 6	0	0.2	Topsoil or Made Ground
Long Dam Level 6	0.2	3.25	Upper Clay (Breydon Formation)
Long Dam Level 6	3.25	8.8	Middle Peat (Breydon Formation)
Long Dam Level 6	8.8	8.9	Lower Clay (Breydon Formation)
Long Dam Level II 1	0	0.15	Topsoil or Made Ground
Long Dam Level II 1	0.15	1.6	Upper Clay (Breydon Formation)
Long Dam Level II 1	1.6	6.6	Middle Peat (Breydon Formation)
Long Dam Level II 1	6.6	7.5	Lower Clay (Breydon Formation)
Long Dam Level II 2	0	0.2	Topsoil or Made Ground
Long Dam Level II 2	0.2	2	Upper Clay (Breydon Formation)
Long Dam Level II 2	2	3	Upper Peat (Breydon Formation)
Marsh Lane 1	0	0.1	Topsoil or Made Ground
Marsh Lane 1	0.1	1.6	Upper Clay (Breydon Formation)
Marsh Lane 1	1.6	4.7	Middle Peat (Breydon Formation)
Marsh Lane 1	4.7	5.05	Lower Clay (Breydon Formation)
Marsh Lane 2	0	0.01	Topsoil or Made Ground
Marsh Lane 2	0.01	1.05	Upper Peat (Breydon Formation)
Marsh Lane 2	1.05	1.55	Upper Clay (Breydon Formation)
Marsh Lane 2	1.55	4.45	Middle Peat (Breydon Formation)
Marsh Lane 2	4.45	4.55	Crag (Norwich Crag and Red Crag)
Marsh Lane 3	0	0.1	Topsoil or Made Ground
Marsh Lane 3	0.1	0.75	Upper Clay (Breydon Formation)
Marsh Lane 3	0.75	4.25	Middle Peat (Breydon Formation)
Marsh Lane 3	4.25	4.5	Lower Clay (Breydon Formation)
Marsh Lane 4	0	0.15	Topsoil or Made Ground
Marsh Lane 4	0.15	3.43	Middle Peat (Breydon Formation)
Marsh Lane 4	3.43	3.55	Lower Clay (Breydon Formation)
Marsh Lane 5	0	0.1	Topsoil or Made Ground
Marsh Lane 5	0.1	3.75	Middle Peat (Breydon Formation)
Marsh Lane 5	3.75	4	Lower Clay (Breydon Formation)
Queen Anne's Road Section 223	0	4	Topsoil or Made Ground
Queen Anne's Road Section 223	4	7.8	Upper Clay (Breydon Formation)
Queen Anne's Road Section 223	7.8	10.9	Middle Peat (Breydon Formation)
Queen Anne's Road Section 223	10.9	17.6	Lower Clay (Breydon Formation)
Queen Anne's Road Section 223	17.6	19.1	Crag (Norwich Crag and Red Crag)
Queen Anne's Road Section 301	0	1	Topsoil or Made Ground
Queen Anne's Road Section 301	1	2.6	Upper Clay (Breydon Formation)

Queen Anne's Road Section 301	2.6	3.5	Middle Peat (Breydon Formation)
Queen Anne's Road Section 301	3.5	7.5	Lower Clay (Breydon Formation)
Queen Anne's Road Section 318	0	0.5	Topsoil or Made Ground
Queen Anne's Road Section 318	0.5	6.4	Upper Clay (Breydon Formation)
Queen Anne's Road Section 318	6.4	9.9	Middle Peat (Breydon Formation)
Queen Anne's Road Section 318	9.9	14.4	Lower Clay (Breydon Formation)
Queen Anne's Road Section IGS 162/38	0	0.95	Topsoil or Made Ground
Queen Anne's Road Section IGS 162/38	0.95	2.2	Middle Peat (Breydon Formation)
Queen Anne's Road Section IGS 162/38	2.2	11.1	Lower Clay (Breydon Formation)
Queen Anne's Road Section IGS 162/39	0	0.9	Topsoil or Made Ground
Queen Anne's Road Section IGS 162/39	0.9	8.6	Lower Clay (Breydon Formation)
Queen Anne's Road Section IGS 162/39	8.6	12.5	Crag (Norwich Crag and Red Crag)
Queen Anne's Road Section P101	0	2	Topsoil or Made Ground
Queen Anne's Road Section P101	2	2.5	Middle Peat (Breydon Formation)
Queen Anne's Road Section P101	2.5	4.5	Lower Clay (Breydon Formation)
Queen Anne's Road Section P103	0	5.4	VOID
Queen Anne's Road Section P103	5.4	10	Crag (Norwich Crag and Red Crag)
Queen Anne's Road Section P105	0	1.4	Topsoil or Made Ground
Queen Anne's Road Section P105	1.4	6.5	Upper Clay (Breydon Formation)
Queen Anne's Road Section P105	6.5	9	Middle Peat (Breydon Formation)
Queen Anne's Road Section P105	9	10	Lower Clay (Breydon Formation)
Richard's Shipyard 1	0	2	Topsoil or Made Ground
Richard's Shipyard 1	2	8	Upper Clay (Breydon Formation)
Richard's Shipyard 1	8	11	Middle Peat (Breydon Formation)
Richard's Shipyard 1	11	18	Lower Clay (Breydon Formation)
Richard's Shipyard 1	18	18.5	Crag (Norwich Crag and Red Crag)
Richard's Shipyard 2B	0	5.45	Topsoil or Made Ground

Richard's Shipyard 2B	5.45	7.45	Upper Clay (Breydon Formation)
Richard's Shipyard 2B	7.45	10.3	Middle Peat (Breydon Formation)
Richard's Shipyard 2B	10.3	18	Lower Clay (Breydon Formation)
Richard's Shipyard 2B	18	18.4	Crag (Norwich Crag and Red Crag)
Scale Marsh 1	0	0.2	Topsoil or Made Ground
Scale Marsh 1	0.2	0.75	Middle Peat (Breydon Formation)
Scale Marsh 1	0.75	1	Lower Clay (Breydon Formation)
Scale Marsh 2	0	0.25	Topsoil or Made Ground
Scale Marsh 2	0.25	0.75	Upper Clay (Breydon Formation)
Scale Marsh 2	0.75	0.85	Middle Peat (Breydon Formation)
Scale Marsh 2	0.85	1	Lower Clay (Breydon Formation)
Scale Marsh 3	0	0.3	Topsoil or Made Ground
Scale Marsh 3	0.3	1.2	Upper Clay (Breydon Formation)
Scale Marsh 3	1.2	3	Middle Peat (Breydon Formation)
Scale Marsh 4	0	0.15	Topsoil or Made Ground
Scale Marsh 4	0.15	1.75	Upper Clay (Breydon Formation)
Scale Marsh 4	1.75	4.15	Middle Peat (Breydon Formation)
Scale Marsh 4	4.15	4.3	Lower Clay (Breydon Formation)
Scale Marsh 5	0	0.15	Topsoil or Made Ground
Scale Marsh 5	0.15	2.45	Upper Clay (Breydon Formation)
Scale Marsh 5	2.45	5.9	Middle Peat (Breydon Formation)
Scale Marsh 5	5.9	6	Lower Clay (Breydon Formation)
Scale Marsh 6	0	0.15	Topsoil or Made Ground
Scale Marsh 6	0.15	3.5	Upper Clay (Breydon Formation)
Scale Marsh 6	3.5	6.73	Middle Peat (Breydon Formation)
Scale Marsh 6	6.73	8.2	Lower Clay (Breydon Formation)
Scale Marsh 7	0	0.2	Topsoil or Made Ground
Scale Marsh 7	0.2	4.4	Upper Clay (Breydon Formation)
Scale Marsh 7	4.4	7.1	Middle Peat (Breydon Formation)
Scale Marsh 7	7.1	9	Lower Clay (Breydon Formation)
Scale Marsh 7	9	9.3	Crag (Norwich Crag and Red Crag)
Share Marsh 1	0	0.1	Topsoil or Made Ground
Share Marsh 1	0.1	8.8	Upper Clay (Breydon Formation)
Share Marsh 1	8.8	10.2	Middle Peat (Breydon Formation)
Share Marsh 1	10.2	10.75	Lower Clay (Breydon Formation)
Share Marsh 2	0	0.5	Topsoil or Made Ground
Share Marsh 2	0.5	4.8	Upper Clay (Breydon Formation)
Share Marsh 2	4.8	8	Middle Peat (Breydon Formation)
Share Marsh 3	0	0.05	Topsoil or Made Ground
Share Marsh 3	0.05	4.7	Upper Clay (Breydon Formation)
Share Marsh 3	4.7	6.05	Middle Peat (Breydon Formation)
Share Marsh 3	6.05	6.75	Lower Clay (Breydon Formation)
Share Marsh 4	0	0.1	Topsoil or Made Ground
Share Marsh 4	0.1	3.5	Upper Clay (Breydon Formation)

Share Marsh 4	3.5	6.75	Middle Peat (Breydon Formation)
Share Marsh 4	6.75	7	Crag (Norwich Crag and Red Crag)
Share Marsh 5	0	0.1	Topsoil or Made Ground
Share Marsh 5	0.1	2.95	Upper Clay (Breydon Formation)
Share Marsh 5	2.95	5.95	Middle Peat (Breydon Formation)
Share Marsh 5	5.95	6.1	Lower Clay (Breydon Formation)
Share Marsh 6	0	0.1	Topsoil or Made Ground
Share Marsh 6	0.1	2.4	Upper Clay (Breydon Formation)
Share Marsh 6	2.4	3.25	Middle Peat (Breydon Formation)
Share Marsh II 1	0	0.15	Topsoil or Made Ground
Share Marsh II 1	0.15	8.9	Upper Clay (Breydon Formation)
Share Marsh II 1	8.9	10	Middle Peat (Breydon Formation)
Share Marsh II 2	0	0.3	Topsoil or Made Ground
Share Marsh II 2	0.3	3.5	Upper Clay (Breydon Formation)
Share Marsh II 2	3.5	7	Middle Peat (Breydon Formation)
Share Marsh II 2	7	8	Lower Clay (Breydon Formation)
Share Marsh II 2	8	8.1	Lower Peat (Breydon Formation)
Share Marsh II 2	8.1	9.7	Crag (Norwich Crag and Red Crag)
Share Marsh II 3	0	0.2	Topsoil or Made Ground
Share Marsh II 3	0.2	3.05	Upper Clay (Breydon Formation)
Share Marsh II 3	3.05	3.5	Middle Peat (Breydon Formation)
Short Dam Level 1	0	0.2	Topsoil or Made Ground
Short Dam Level 1	0.2	2.85	Upper Clay (Breydon Formation)
Short Dam Level 1	2.85	6.4	Middle Peat (Breydon Formation)
Short Dam Level 1	6.4	6.75	Lower Clay (Breydon Formation)
Short Dam Level 1	6.75	7.8	Lower Peat (Breydon Formation)
Short Dam Level 1	7.8	8.25	Crag (Norwich Crag and Red Crag)
Short Dam Level 2	0	0.15	Topsoil or Made Ground
Short Dam Level 2	0.15	2.4	Upper Clay (Breydon Formation)
Short Dam Level 2	2.4	5.5	Middle Peat (Breydon Formation)
Short Dam Level 2	5.5	7.5	Lower Clay (Breydon Formation)
Short Dam Level 2	7.5	8.1	Lower Peat (Breydon Formation)
Short Dam Level 2	8.1	8.3	Crag (Norwich Crag and Red Crag)
Short Dam Level II 1	0	0.2	Topsoil or Made Ground
Short Dam Level II 1	0.2	3.45	Upper Clay (Breydon Formation)
Short Dam Level II 1	3.45	7.1	Middle Peat (Breydon Formation)
Short Dam Level II 1	7.1	7.9	Lower Clay (Breydon Formation)
Short Dam Level II 1	7.9	9.1	Lower Peat (Breydon Formation)
Short Dam Level II 2	0	0.1	Topsoil or Made Ground
Short Dam Level II 2	0.1	4	Upper Clay (Breydon Formation)
Short Dam Level II 2	4	9.1	Middle Peat (Breydon Formation)
Short Dam Level II 2	9.1	9.25	Lower Clay (Breydon Formation)
Short Dam Level II 3	0	0.2	Topsoil or Made Ground
Short Dam Level II 3	0.2	3	Upper Clay (Breydon Formation)

Short Dam Level II 3	3	4	Middle Peat (Breydon Formation)
Short Dam Level II 4	0	0.15	Topsoil or Made Ground
Short Dam Level II 4	0.15	2.5	Upper Clay (Breydon Formation)
Short Dam Level II 4	2.5	6.7	Middle Peat (Breydon Formation)
Short Dam Level II 4	6.7	8.5	Lower Clay (Breydon Formation)
Short Dam Level II 4	8.5	9.75	Lower Peat (Breydon Formation)
Short Dam Level II 4	9.75	10	Crag (Norwich Crag and Red Crag)
Somerleyton Marsh 1	0	0.3	Topsoil or Made Ground
Somerleyton Marsh 1	0.3	3.37	Upper Clay (Breydon Formation)
Somerleyton Marsh 1	3.37	6.1	Middle Peat (Breydon Formation)
Somerleyton Marsh 1	6.1	12.31	Lower Clay (Breydon Formation)
Somerleyton Marsh 1	12.31	12.89	Lower Peat (Breydon Formation)
Somerleyton Marsh 2	0	0.25	Topsoil or Made Ground
Somerleyton Marsh 2	0.25	3.9	Upper Clay (Breydon Formation)
Somerleyton Marsh 2	3.9	6.5	Middle Peat (Breydon Formation)
Somerleyton Marsh 2	6.5	7.5	Lower Clay (Breydon Formation)
Somerleyton Marsh 3	0	0.15	Topsoil or Made Ground
Somerleyton Marsh 3	0.15	3.3	Upper Clay (Breydon Formation)
Somerleyton Marsh 3	3.3	6.1	Middle Peat (Breydon Formation)
Somerleyton Marsh 3	6.1	10.5	Lower Clay (Breydon Formation)
SRV1 Beccles 1	0	2.4	Upper Peat (Breydon Formation)
SRV1 Beccles 1	2.4	5.2	Middle Peat (Breydon Formation)
SRV1 Beccles 10	0	2.05	Upper Peat (Breydon Formation)
SRV1 Beccles 10	2.05	5.5	Middle Peat (Breydon Formation)
SRV1 Beccles 11	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 11	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 11	1	6.05	Middle Peat (Breydon Formation)
SRV1 Beccles 12	0	1.9	Upper Peat (Breydon Formation)
SRV1 Beccles 12	1.9	5	Middle Peat (Breydon Formation)
SRV1 Beccles 12	5	5.7	Lower Peat (Breydon Formation)
SRV1 Beccles 13	0	0.5	Upper Peat (Breydon Formation)
SRV1 Beccles 13	0.5	0.8	Upper Clay (Breydon Formation)
SRV1 Beccles 13	0.8	5.75	Middle Peat (Breydon Formation)
SRV1 Beccles 14	0	0.35	Upper Peat (Breydon Formation)
SRV1 Beccles 14	0.35	1.95	Upper Clay (Breydon Formation)
SRV1 Beccles 14	1.95	5.7	Middle Peat (Breydon Formation)
SRV1 Beccles 15	0	0.8	Upper Peat (Breydon Formation)
SRV1 Beccles 15	0.8	1	Upper Clay (Breydon Formation)
SRV1 Beccles 15	1	5.7	Middle Peat (Breydon Formation)
SRV1 Beccles 16	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 16	0.9	1.1	Upper Clay (Breydon Formation)
SRV1 Beccles 16	1.1	5.7	Middle Peat (Breydon Formation)
SRV1 Beccles 17	0	0.8	Upper Peat (Breydon Formation)
SRV1 Beccles 17	0.8	1.8	Upper Clay (Breydon Formation)

SRV1 Beccles 17	1.8	4.8	Middle Peat (Breydon Formation)
SRV1 Beccles 18	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 18	0.9	1.3	Upper Clay (Breydon Formation)
SRV1 Beccles 18	1.3	5.7	Middle Peat (Breydon Formation)
SRV1 Beccles 19	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 19	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 19	1	4.9	Middle Peat (Breydon Formation)
SRV1 Beccles 2	0	0.95	Upper Peat (Breydon Formation)
SRV1 Beccles 2	0.95	1.2	Upper Clay (Breydon Formation)
SRV1 Beccles 2	1.2	5.15	Middle Peat (Breydon Formation)
SRV1 Beccles 20	0	0.2	Upper Peat (Breydon Formation)
SRV1 Beccles 20	0.2	2.3	Upper Clay (Breydon Formation)
SRV1 Beccles 20	2.3	3.9	Middle Peat (Breydon Formation)
SRV1 Beccles 21	0	0.16	VOID
SRV1 Beccles 21	0.16	2.84	Upper Clay (Breydon Formation)
SRV1 Beccles 21	2.84	3.74	Middle Peat (Breydon Formation)
SRV1 Beccles 22	0	3.6	Upper Clay (Breydon Formation)
SRV1 Beccles 22	3.6	4	Middle Peat (Breydon Formation)
SRV1 Beccles 23	0	4.9	Upper Clay (Breydon Formation)
SRV1 Beccles 24	0	4.3	Upper Clay (Breydon Formation)
SRV1 Beccles 24	4.3	5	Middle Peat (Breydon Formation)
SRV1 Beccles 25	0	3.35	Upper Clay (Breydon Formation)
SRV1 Beccles 25	3.35	4	Middle Peat (Breydon Formation)
SRV1 Beccles 26	0	1.9	Upper Clay (Breydon Formation)
SRV1 Beccles 26	1.9	2.9	Middle Peat (Breydon Formation)
SRV1 Beccles 27	0	0.8	Upper Clay (Breydon Formation)
SRV1 Beccles 27	0.8	1.9	Middle Peat (Breydon Formation)
SRV1 Beccles 28	0	0.2	Upper Clay (Breydon Formation)
SRV1 Beccles 28	0.2	5.6	Middle Peat (Breydon Formation)
SRV1 Beccles 29	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 29	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 29	1	5.4	Middle Peat (Breydon Formation)
SRV1 Beccles 29	5.4	5.6	Lower Clay (Breydon Formation)
SRV1 Beccles 3	0	0.95	Upper Peat (Breydon Formation)
SRV1 Beccles 3	0.95	1	Upper Clay (Breydon Formation)
SRV1 Beccles 3	1	4.7	Middle Peat (Breydon Formation)
SRV1 Beccles 30	0	0.8	Upper Peat (Breydon Formation)
SRV1 Beccles 30	0.8	1	Upper Clay (Breydon Formation)
SRV1 Beccles 30	1	5.6	Middle Peat (Breydon Formation)
SRV1 Beccles 31	0	0.8	Upper Clay (Breydon Formation)
SRV1 Beccles 31	0.8	5.3	Middle Peat (Breydon Formation)
SRV1 Beccles 33	0	0.7	Upper Clay (Breydon Formation)
SRV1 Beccles 33	0.7	5.2	Middle Peat (Breydon Formation)
SRV1 Beccles 34	0	2.45	Upper Clay (Breydon Formation)

SRV1 Beccles 34	2.45	3.3	Middle Peat (Breydon Formation)
SRV1 Beccles 35	0	1.7	Upper Clay (Breydon Formation)
SRV1 Beccles 35	1.7	2.9	Middle Peat (Breydon Formation)
SRV1 Beccles 36	0	1.4	Upper Clay (Breydon Formation)
SRV1 Beccles 36	1.4	2.9	Middle Peat (Breydon Formation)
SRV1 Beccles 37	0	1.3	Upper Clay (Breydon Formation)
SRV1 Beccles 37	1.3	2.9	Middle Peat (Breydon Formation)
SRV1 Beccles 38	0	0.9	Upper Clay (Breydon Formation)
SRV1 Beccles 38	0.9	5.65	Middle Peat (Breydon Formation)
SRV1 Beccles 39	0	0.8	Upper Peat (Breydon Formation)
SRV1 Beccles 39	0.8	1	Upper Clay (Breydon Formation)
SRV1 Beccles 39	1	5.5	Middle Peat (Breydon Formation)
SRV1 Beccles 4	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 4	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 4	1	4.5	Middle Peat (Breydon Formation)
SRV1 Beccles 40	0	0.8	Upper Peat (Breydon Formation)
SRV1 Beccles 40	0.8	0.9	Upper Clay (Breydon Formation)
SRV1 Beccles 40	0.9	5.5	Middle Peat (Breydon Formation)
SRV1 Beccles 41	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 41	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 41	1	5.3	Middle Peat (Breydon Formation)
SRV1 Beccles 42	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 42	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 42	1	5.1	Middle Peat (Breydon Formation)
SRV1 Beccles 43	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 43	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 43	1	4.8	Middle Peat (Breydon Formation)
SRV1 Beccles 44	0	4.6	Middle Peat (Breydon Formation)
SRV1 Beccles 45	0	2.5	Upper Peat (Breydon Formation)
SRV1 Beccles 45	2.5	4.6	Middle Peat (Breydon Formation)
SRV1 Beccles 46	0	0.85	Upper Peat (Breydon Formation)
SRV1 Beccles 46	0.85	1	Upper Clay (Breydon Formation)
SRV1 Beccles 46	1	5.45	Middle Peat (Breydon Formation)
SRV1 Beccles 5	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 5	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 5	1	4.4	Middle Peat (Breydon Formation)
SRV1 Beccles 6	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 6	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 6	1	4.2	Middle Peat (Breydon Formation)
SRV1 Beccles 7	0	0.9	Upper Peat (Breydon Formation)
SRV1 Beccles 7	0.9	1	Upper Clay (Breydon Formation)
SRV1 Beccles 7	1	4.05	Middle Peat (Breydon Formation)
SRV1 Beccles 8	0	2.1	Upper Peat (Breydon Formation)
SRV1 Beccles 8	2.1	5.25	Middle Peat (Breydon Formation)

SRV1 Beccles 9	0	1.9	Upper Peat (Breydon Formation)
SRV1 Beccles 9	1.9	5.4	Middle Peat (Breydon Formation)
SRV2 Beccles 1	0	0.4	Topsoil or Made Ground
SRV2 Beccles 1	0.4	0.62	Upper Peat (Breydon Formation)
SRV2 Beccles 1	0.62	3.6	Middle Peat (Breydon Formation)
SRV2 Beccles 1	3.6	4.6	Lower Peat (Breydon Formation)
SRV2 Beccles 2	0	1	Topsoil or Made Ground
SRV2 Beccles 2	1	1.38	Upper Peat (Breydon Formation)
SRV2 Beccles 2	1.38	3.6	Middle Peat (Breydon Formation)
SRV2 Beccles 2	3.6	4.3	Lower Peat (Breydon Formation)
Stanley Carr 1	0	1.1	Upper Peat (Breydon Formation)
Stanley Carr 1	1.1	5	Middle Peat (Breydon Formation)
Stanley Carr 1	5	5.25	Lower Clay (Breydon Formation)
Stanley Carr 2	0	0.7	Upper Peat (Breydon Formation)
Stanley Carr 2	0.7	1.25	Upper Clay (Breydon Formation)
Stanley Carr 2	1.25	6.75	Middle Peat (Breydon Formation)
Stanley Carr 3	0	0.1	Topsoil or Made Ground
Stanley Carr 3	0.1	0.75	Upper Peat (Breydon Formation)
Stanley Carr 3	0.75	2.15	Upper Clay (Breydon Formation)
Stanley Carr 3	2.15	4	Middle Peat (Breydon Formation)
Stanley Carr 3	4	4.25	Lower Clay (Breydon Formation)
Stanley Carr 4	0	0.15	Topsoil or Made Ground
Stanley Carr 4	0.15	0.75	Upper Peat (Breydon Formation)
Stanley Carr 4	0.75	4.75	Middle Peat (Breydon Formation)
Stanley Carr 4	4.75	5	Lower Clay (Breydon Formation)
Stanley Carr 5	0	0.2	Topsoil or Made Ground
Stanley Carr 5	0.2	0.85	Upper Peat (Breydon Formation)
Stanley Carr 5	0.85	1.8	Middle Peat (Breydon Formation)
Stanley Carr 5	1.8	2.2	Lower Clay (Breydon Formation)
Stanley Carr 6	0	1.26	Upper Peat (Breydon Formation)
Stanley Carr 6	1.26	2.93	Middle Peat (Breydon Formation)
Stanley Carr 6	2.93	2.97	Lower Clay (Breydon Formation)
Sutton's Farm 1	0	0.5	Upper Clay (Breydon Formation)
Sutton's Farm 1	0.5	0.7	Middle Peat (Breydon Formation)
Sutton's Farm 1	0.7	1.5	Lower Clay (Breydon Formation)
Sutton's Farm 2	0	0.2	Topsoil or Made Ground
Sutton's Farm 2	0.2	0.8	Upper Clay (Breydon Formation)
Sutton's Farm 2	0.8	5.6	Middle Peat (Breydon Formation)
Sutton's Farm 2	5.6	5.75	Lower Clay (Breydon Formation)
Sutton's Farm 3	0	0.15	Topsoil or Made Ground
Sutton's Farm 3	0.15	0.75	Upper Clay (Breydon Formation)
Sutton's Farm 3	0.75	4.55	Middle Peat (Breydon Formation)
Sutton's Farm 3	4.55	4.9	Lower Clay (Breydon Formation)
Sutton's Farm 4	0	0.1	Topsoil or Made Ground

Sutton's Farm 4	0.1	0.7	Upper Clay (Breydon Formation)
Sutton's Farm 4	0.7	5.9	Middle Peat (Breydon Formation)
Sutton's Farm 4	5.9	6	Lower Clay (Breydon Formation)
Sutton's Farm 5	0	0.2	Topsoil or Made Ground
Sutton's Farm 5	0.2	2.05	Upper Clay (Breydon Formation)
Sutton's Farm 5	2.05	8	Middle Peat (Breydon Formation)
Sutton's Farm 5	8	8.2	Lower Clay (Breydon Formation)
Sutton's Farm 6	0	0.1	Topsoil or Made Ground
Sutton's Farm 6	0.1	0.9	Upper Clay (Breydon Formation)
Sutton's Farm 6	0.9	4.4	Middle Peat (Breydon Formation)
TG30NE10 Oaks Farm Southwold	0	26.82	Crag (Norwich Crag and Red Crag)
TG30NE10 Oaks Farm Southwold	26.82	73.15	London Clay
TG30NE10 Oaks Farm Southwold	73.15	91.44	Upper Chalk
TG30SE100 -- University of East Anglia	0	11.1	Alluvium (Composite Breydon Formation)
TG30SE101 -- University of East Anglia	0	3.3	Upper Clay (Breydon Formation)
TG30SE101 -- University of East Anglia	3.3	4	Middle Peat (Breydon Formation)
TG30SE102 -- University of East Anglia	0	3.6	Upper Clay (Breydon Formation)
TG30SE102 -- University of East Anglia	3.6	3.9	Middle Peat (Breydon Formation)
TG30SE103 -- University of East Anglia	0	2.8	Upper Clay (Breydon Formation)
TG30SE103 -- University of East Anglia	2.8	2.9	Middle Peat (Breydon Formation)
TG30SE104 -- University of East Anglia	0	2.7	Upper Clay (Breydon Formation)
TG30SE104 -- University of East Anglia	2.7	2.9	Middle Peat (Breydon Formation)
TG30SE97 -- University East Anglia	0	0.6	Upper Peat (Breydon Formation)
TG30SE97 -- University East Anglia	0.6	1.4	Upper Clay (Breydon Formation)
TG30SE97 -- University East Anglia	1.4	6.2	Middle Peat (Breydon Formation)
TG30SE97 -- University East Anglia	6.2	6.5	Lower Clay (Breydon Formation)
TG30SE98 -- University of East Anglia	0	0.3	Upper Peat (Breydon Formation)
TG30SE98 -- University of East Anglia	0.3	0.8	Upper Clay (Breydon Formation)
TG30SE98 -- University of East Anglia	0.8	4.8	Middle Peat (Breydon Formation)

TG30SE98 -- University of East Anglia	4.8	5.2	Lower Peat (Breydon Formation)
TG30SE99 -- University of East Anglia	0	0.5	Upper Peat (Breydon Formation)
TG30SE99 -- University of East Anglia	0.5	0.6	Upper Clay (Breydon Formation)
TG30SE99 -- University of East Anglia	0.6	2.8	Middle Peat (Breydon Formation)
TG30SE99 -- University of East Anglia	2.8	2.9	Lower Peat (Breydon Formation)
TG40NE10 -- UEA	0	5.6	Upper Clay (Breydon Formation)
TG40NE10 -- UEA	5.6	6.8	Middle Peat (Breydon Formation)
TG40NE10 -- UEA	6.8	9	Lower Clay (Breydon Formation)
TG40NE11 -- UEA	0	5.7	Upper Clay (Breydon Formation)
TG40NE11 -- UEA	5.7	6.6	Middle Peat (Breydon Formation)
TG40NE11 -- UEA	6.6	12	Lower Clay (Breydon Formation)
TG40NE12 -- UEA	0	6.4	Upper Clay (Breydon Formation)
TG40NE12 -- UEA	6.4	7.8	Middle Peat (Breydon Formation)
TG40NE12 -- UEA	7.8	12	Lower Clay (Breydon Formation)
TG40NE13 -- UEA	0	7.4	Upper Clay (Breydon Formation)
TG40NE13 -- UEA	7.4	7.9	Middle Peat (Breydon Formation)
TG40NE13 -- UEA	7.9	10.4	Lower Clay (Breydon Formation)
TG40NE18	0	1.7	Topsoil or Made Ground
TG40NE18	1.7	6.9	Upper Clay (Breydon Formation)
TG40NE18	6.9	8.3	Middle Peat (Breydon Formation)
TG40NE18	8.3	11.43	Lower Clay (Breydon Formation)
TG40NE2	0	0.6	Middle Peat (Breydon Formation)
TG40NE2	0.6	1.2	Corton Beds
TG40NE21	0	1.85	Topsoil or Made Ground
TG40NE21	1.85	7.65	Upper Clay (Breydon Formation)
TG40NE21	7.65	12.2	Lower Clay (Breydon Formation)
TG40NE22	0	3.3	Upper Clay (Breydon Formation)
TG40NE22	3.3	5.14	Middle Peat (Breydon Formation)
TG40NE23	0	4.2	Upper Clay (Breydon Formation)
TG40NE23	4.2	4.6	Middle Peat (Breydon Formation)
TG40NE24	0	3.3	Upper Clay (Breydon Formation)
TG40NE25	0	0.7	Upper Clay (Breydon Formation)
TG40NE26	0	0.4	Upper Peat (Breydon Formation)
TG40NE26	0.4	0.8	Upper Clay (Breydon Formation)
TG40NE27	0	0.4	Upper Peat (Breydon Formation)
TG40NE27	0.4	0.8	Middle Peat (Breydon Formation)
TG40NE28	0	2	Upper Clay (Breydon Formation)
TG40NE28	2	3	Middle Peat (Breydon Formation)
TG40NE29	0	4.1	Upper Clay (Breydon Formation)
TG40NE29	4.1	5	Middle Peat (Breydon Formation)

TG40NE3 -- UEA	0	6	Upper Clay (Breydon Formation)
TG40NE3 -- UEA	6	6.6	Middle Peat (Breydon Formation)
TG40NE3 -- UEA	6.6	8.3	Lower Clay (Breydon Formation)
TG40NE30	0	0.4	Upper Peat (Breydon Formation)
TG40NE30	0.4	1.3	Middle Peat (Breydon Formation)
TG40NE31	0	0.3	Upper Peat (Breydon Formation)
TG40NE31	0.3	1.9	Upper Clay (Breydon Formation)
TG40NE31	1.9	3	Middle Peat (Breydon Formation)
TG40NE32	0	3.1	Upper Clay (Breydon Formation)
TG40NE32	3.1	4.1	Middle Peat (Breydon Formation)
TG40NE33	0	5.55	Upper Clay (Breydon Formation)
TG40NE33	5.55	5.7	Middle Peat (Breydon Formation)
TG40NE34	0	4.45	Upper Clay (Breydon Formation)
TG40NE34	4.45	4.8	Middle Peat (Breydon Formation)
TG40NE35	0	5.9	Upper Clay (Breydon Formation)
TG40NE36	0	0.9	Upper Clay (Breydon Formation)
TG40NE36	0.9	2.6	Middle Peat (Breydon Formation)
TG40NE37	0	1.8	Middle Peat (Breydon Formation)
TG40NE38	0	2.3	Upper Clay (Breydon Formation)
TG40NE38	2.3	4.8	Middle Peat (Breydon Formation)
TG40NE39	0	3.25	Upper Clay (Breydon Formation)
TG40NE39	3.25	5.2	Middle Peat (Breydon Formation)
TG40NE4 -- UEA	0	5.8	Upper Clay (Breydon Formation)
TG40NE4 -- UEA	5.8	6.6	Middle Peat (Breydon Formation)
TG40NE4 -- UEA	6.6	9.3	Lower Clay (Breydon Formation)
TG40NE40	0	4.85	Upper Clay (Breydon Formation)
TG40NE40	4.85	5	Middle Peat (Breydon Formation)
TG40NE41	0	5.6	Upper Clay (Breydon Formation)
TG40NE41	5.6	5.8	Middle Peat (Breydon Formation)
TG40NE42	0	0.4	Upper Peat (Breydon Formation)
TG40NE42	0.4	0.6	Upper Clay (Breydon Formation)
TG40NE42	0.6	0.9	Middle Peat (Breydon Formation)
TG40NE43	0	1.55	Upper Clay (Breydon Formation)
TG40NE43	1.55	3.8	Middle Peat (Breydon Formation)
TG40NE44	0	2.5	Upper Clay (Breydon Formation)
TG40NE44	2.5	4	Middle Peat (Breydon Formation)
TG40NE45	0	4.65	Upper Clay (Breydon Formation)
TG40NE45	4.65	5	Middle Peat (Breydon Formation)
TG40NE46	0	2.9	Upper Clay (Breydon Formation)
TG40NE46	2.9	4	Middle Peat (Breydon Formation)
TG40NE47	0	4.4	Upper Clay (Breydon Formation)
TG40NE47	4.4	4.6	Middle Peat (Breydon Formation)
TG40NE48	0	0.4	Upper Peat (Breydon Formation)
TG40NE48	0.4	1	Upper Clay (Breydon Formation)

TG40NE48	1	6	Middle Peat (Breydon Formation)
TG40NE49	0	3.3	Upper Clay (Breydon Formation)
TG40NE49	3.3	4	Middle Peat (Breydon Formation)
TG40NE5 -- UEA	0	6	Upper Clay (Breydon Formation)
TG40NE5 -- UEA	6	6.7	Middle Peat (Breydon Formation)
TG40NE5 -- UEA	6.7	8.3	Lower Clay (Breydon Formation)
TG40NE51	0	1.9	Upper Clay (Breydon Formation)
TG40NE51	1.9	3	Middle Peat (Breydon Formation)
TG40NE53	0	0.3	Upper Peat (Breydon Formation)
TG40NE53	0.3	2.6	Upper Clay (Breydon Formation)
TG40NE53	2.6	3	Middle Peat (Breydon Formation)
TG40NE54	0	5.4	Upper Clay (Breydon Formation)
TG40NE55	0	4	Upper Clay (Breydon Formation)
TG40NE56	0	5	Upper Clay (Breydon Formation)
TG40NE57	0	4.2	Upper Clay (Breydon Formation)
TG40NE6 -- UEA	0	6.1	Upper Clay (Breydon Formation)
TG40NE6 -- UEA	6.1	6.9	Middle Peat (Breydon Formation)
TG40NE6 -- UEA	6.9	9.8	Lower Clay (Breydon Formation)
TG40NE65	0	1.57	Topsoil or Made Ground
TG40NE65	1.57	17.96	Alluvium (Composite Breydon Formation)
TG40NE66	0	1.2	Topsoil or Made Ground
TG40NE66	1.2	5.41	Upper Clay (Breydon Formation)
TG40NE66	5.41	7.29	Middle Peat (Breydon Formation)
TG40NE66	7.29	18.49	Lower Clay (Breydon Formation)
TG40NE67	0	1.09	Topsoil or Made Ground
TG40NE67	1.09	5.48	Upper Clay (Breydon Formation)
TG40NE67	5.48	6.34	Middle Peat (Breydon Formation)
TG40NE67	6.43	18.3	Lower Clay (Breydon Formation)
TG40NE68	0	1.25	Topsoil or Made Ground
TG40NE68	1.25	4.15	Upper Clay (Breydon Formation)
TG40NE69	0	1.56	Topsoil or Made Ground
TG40NE69	1.56	6.58	Upper Clay (Breydon Formation)
TG40NE69	6.58	6.93	Middle Peat (Breydon Formation)
TG40NE69	6.93	17.94	Lower Clay (Breydon Formation)
TG40NE7 -- UEA	0	6	Upper Clay (Breydon Formation)
TG40NE7 -- UEA	6	6.7	Middle Peat (Breydon Formation)
TG40NE7 -- UEA	6.7	12	Lower Clay (Breydon Formation)
TG40NE70	0	1.6	Topsoil or Made Ground
TG40NE70	1.6	4.66	Upper Clay (Breydon Formation)
TG40NE70	4.66	6.05	Middle Peat (Breydon Formation)
TG40NE70	6.05	15.59	Lower Clay (Breydon Formation)
TG40NE70	15.59	16.06	Lower Peat (Breydon Formation)
TG40NE70	16.06	16.44	Crag (Norwich Crag and Red Crag)
TG40NE71	0	1.09	Topsoil or Made Ground

TG40NE71	1.09	3.69	Upper Clay (Breydon Formation)
TG40NE71	3.69	6.18	Middle Peat (Breydon Formation)
TG40NE71	6.18	14.91	Lower Clay (Breydon Formation)
TG40NE71	14.91	15.53	Lower Peat (Breydon Formation)
TG40NE72	0	1.46	Topsoil or Made Ground
TG40NE72	1.46	5.5	Upper Clay (Breydon Formation)
TG40NE72	5.5	7.21	Middle Peat (Breydon Formation)
TG40NE72	7.21	16.47	Lower Clay (Breydon Formation)
TG40NE72	16.47	16.49	Crag (Norwich Crag and Red Crag)
TG40NE73	0	1.4	Topsoil or Made Ground
TG40NE73	1.4	4.52	Upper Clay (Breydon Formation)
TG40NE73	4.52	7.33	Middle Peat (Breydon Formation)
TG40NE73	7.33	19.37	Lower Clay (Breydon Formation)
TG40NE8 -- UEA	0	5.1	Upper Clay (Breydon Formation)
TG40NE8 -- UEA	5.1	6.7	Middle Peat (Breydon Formation)
TG40NE8 -- UEA	6.7	12	Lower Clay (Breydon Formation)
TG40NE9 -- UEA	0	5.8	Upper Clay (Breydon Formation)
TG40NE9 -- UEA	5.8	6.5	Middle Peat (Breydon Formation)
TG40NE9 -- UEA	6.5	12	Lower Clay (Breydon Formation)
TG40NE95	0	0.3	Topsoil or Made Ground
TG40NE95	0.3	4.95	Upper Clay (Breydon Formation)
TG40NE95	4.95	7.18	Middle Peat (Breydon Formation)
TG40NE95	7.18	17.2	Lower Clay (Breydon Formation)
TG40NE95	17.2	17.48	Corton Beds
TG40NE95	17.48	17.78	Crag (Norwich Crag and Red Crag)
TG40NW10	0	2.44	Lowestoft Till
TG40NW10	2.44	15.54	Crag (Norwich Crag and Red Crag)
TG40NW11	0	0.1	Upper Clay (Breydon Formation)
TG40NW11	0.1	3.6	Middle Peat (Breydon Formation)
TG40NW11	3.6	3.7	Lower Clay (Breydon Formation)
TG40NW12	0	2.4	Upper Clay (Breydon Formation)
TG40NW12	2.4	5	Middle Peat (Breydon Formation)
TG40NW13	0	4.4	Upper Clay (Breydon Formation)
TG40NW13	4.4	5.1	Middle Peat (Breydon Formation)
TG40NW14	0	5	Upper Clay (Breydon Formation)
TG40NW14	5	5.5	Middle Peat (Breydon Formation)
TG40NW21	0	0.9	Upper Clay (Breydon Formation)
TG40NW21	0.9	3.6	Middle Peat (Breydon Formation)
TG40NW21	3.6	3.7	Lower Clay (Breydon Formation)
TG40NW22	0	1.7	Upper Clay (Breydon Formation)
TG40NW22	1.7	3.7	Middle Peat (Breydon Formation)
TG40NW22	3.7	3.8	Lower Clay (Breydon Formation)
TG40NW23	0	0.4	Upper Peat (Breydon Formation)
TG40NW23	0.4	1.2	Upper Clay (Breydon Formation)

TG40NW23	1.2	1.8	Middle Peat (Breydon Formation)
TG40NW23	1.8	1.9	Lower Clay (Breydon Formation)
TG40NW24	0	0.3	Upper Peat (Breydon Formation)
TG40NW24	0.3	1.1	Upper Clay (Breydon Formation)
TG40NW24	1.1	1.9	Middle Peat (Breydon Formation)
TG40NW24	1.9	2	Lower Clay (Breydon Formation)
TG40NW25	0	0.3	Upper Peat (Breydon Formation)
TG40NW25	0.3	1.1	Upper Clay (Breydon Formation)
TG40NW25	1.1	1.9	Middle Peat (Breydon Formation)
TG40NW25	1.9	2	Lower Clay (Breydon Formation)
TG40NW29	0	0.4	Topsoil or Made Ground
TG40NW29	0.4	1.15	Upper Clay (Breydon Formation)
TG40NW29	1.15	2.05	Middle Peat (Breydon Formation)
TG40NW29	2.05	2.3	Lower Clay (Breydon Formation)
TG40NW70	0	0.61	Topsoil or Made Ground
TG40NW70	0.61	14.33	Lower Clay (Breydon Formation)
TG40NW70	14.33	15.24	Terrace Gravel (Devensian)
TG40NW70	15.24	15.85	Lowestoft Till
TG40NW75	0	18.59	VOID
TG40NW75	18.59	22.86	Crag (Norwich Crag and Red Crag)
TG40NW75	22.86	57.404	London Clay
TG40NW9	0	19.82	Lowestoft Till
TG40NW9	19.82	23.01	Crag (Norwich Crag and Red Crag)
TG40SE1	0	0.61	Topsoil or Made Ground
TG40SE1	0.61	15.85	Corton Beds
TG40SE1	15.85	21.64	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG40SE10	0	8	Upper Clay (Breydon Formation)
TG40SE10	8	8.5	Middle Peat (Breydon Formation)
TG40SE102	0	1.2	Corton Beds
TG40SE102	1.2	16.5	Crag (Norwich Crag and Red Crag)
TG40SE106	0	0.4	Topsoil or Made Ground
TG40SE106	0.4	12.8	Alluvium (Composite Breydon Formation)
TG40SE107	0	14	Alluvium (Composite Breydon Formation)
TG40SE107	14	30	Crag (Norwich Crag and Red Crag)
TG40SE11	0	7.3	Upper Clay (Breydon Formation)
TG40SE11	7.3	7.8	Middle Peat (Breydon Formation)
TG40SE12	0	7.5	Upper Clay (Breydon Formation)
TG40SE12	7.5	8	Middle Peat (Breydon Formation)
TG40SE13	0	6	Upper Clay (Breydon Formation)
TG40SE13	6	6.5	Middle Peat (Breydon Formation)
TG40SE14	0	7	Upper Clay (Breydon Formation)
TG40SE14	7	7.5	Middle Peat (Breydon Formation)

TG40SE16	0	0.2	Corton Beds
TG40SE17	0	0.15	Topsoil or Made Ground
TG40SE17	0.15	2	Corton Beds
TG40SE18	0	0.6	Topsoil or Made Ground
TG40SE18	0.6	2	Corton Beds
TG40SE19	0	0.3	Topsoil or Made Ground
TG40SE19	0.3	2	Corton Beds
TG40SE2	0	8.5	Lowestoft Till
TG40SE20	0	4	Upper Peat (Breydon Formation)
TG40SE20	4	23	Lowestoft Till
TG40SE20	23	40	Lowestoft Till
TG40SE20	40	50	Crag (Norwich Crag and Red Crag)
TG40SE21	0	5	Corton Beds
TG40SE21	5	47	Crag (Norwich Crag and Red Crag)
TG40SE21	47	85	London Clay
TG40SE22	0	0.6	Upper Peat (Breydon Formation)
TG40SE23	0	0.9	Upper Peat (Breydon Formation)
TG40SE23	0.9	1.8	Upper Clay (Breydon Formation)
TG40SE23	1.8	4	Middle Peat (Breydon Formation)
TG40SE24	0	5.7	Upper Clay (Breydon Formation)
TG40SE24	5.7	6	Middle Peat (Breydon Formation)
TG40SE25	0	5.8	Upper Clay (Breydon Formation)
TG40SE25	5.8	6	Middle Peat (Breydon Formation)
TG40SE26	0	5.7	Upper Clay (Breydon Formation)
TG40SE27	0	4.3	Upper Clay (Breydon Formation)
TG40SE27	4.3	5	Middle Peat (Breydon Formation)
TG40SE28	0	0.3	Upper Peat (Breydon Formation)
TG40SE28	0.3	2.7	Upper Clay (Breydon Formation)
TG40SE28	2.7	5	Middle Peat (Breydon Formation)
TG40SE29	0	3.2	Upper Clay (Breydon Formation)
TG40SE29	3.2	5	Middle Peat (Breydon Formation)
TG40SE3	0	17	Lowestoft Till
TG40SE3	17	21.55	Crag (Norwich Crag and Red Crag)
TG40SE30	0	0.3	Topsoil or Made Ground
TG40SE30	0.3	3.65	Upper Clay (Breydon Formation)
TG40SE30	3.65	4	Middle Peat (Breydon Formation)
TG40SE31	0	3.8	Upper Clay (Breydon Formation)
TG40SE31	3.8	4	Middle Peat (Breydon Formation)
TG40SE32	0	0.3	Upper Peat (Breydon Formation)
TG40SE32	0.3	3.65	Upper Clay (Breydon Formation)
TG40SE32	3.65	4	Middle Peat (Breydon Formation)
TG40SE33	0	0.3	Upper Peat (Breydon Formation)
TG40SE33	0.3	5.6	Upper Clay (Breydon Formation)
TG40SE34	0	4.85	Upper Clay (Breydon Formation)

TG40SE34	4.85	5	Middle Peat (Breydon Formation)
TG40SE35	0	0.3	Upper Peat (Breydon Formation)
TG40SE35	0.3	2.6	Upper Clay (Breydon Formation)
TG40SE35	2.6	3	Middle Peat (Breydon Formation)
TG40SE36	0	0.3	Upper Peat (Breydon Formation)
TG40SE36	0.3	3.4	Upper Clay (Breydon Formation)
TG40SE36	3.4	4	Middle Peat (Breydon Formation)
TG40SE37	0	0.2	Upper Peat (Breydon Formation)
TG40SE37	0.2	3.1	Upper Clay (Breydon Formation)
TG40SE37	3.1	4	Middle Peat (Breydon Formation)
TG40SE38	0	5.5	Upper Clay (Breydon Formation)
TG40SE38	5.5	6	Middle Peat (Breydon Formation)
TG40SE39	0	0.3	Topsoil or Made Ground
TG40SE39	0.3	3.6	Upper Clay (Breydon Formation)
TG40SE39	3.6	4	Middle Peat (Breydon Formation)
TG40SE4	0	6.2	Upper Clay (Breydon Formation)
TG40SE4	6.2	6.7	Middle Peat (Breydon Formation)
TG40SE40	0	0.3	Topsoil or Made Ground
TG40SE40	0.3	5.3	Upper Clay (Breydon Formation)
TG40SE40	5.3	5.6	Middle Peat (Breydon Formation)
TG40SE41	0	0.3	Topsoil or Made Ground
TG40SE41	0.3	4.3	Upper Clay (Breydon Formation)
TG40SE41	4.3	5	Middle Peat (Breydon Formation)
TG40SE42	0	0.3	Topsoil or Made Ground
TG40SE42	0.3	3.3	Upper Clay (Breydon Formation)
TG40SE42	3.3	4	Middle Peat (Breydon Formation)
TG40SE43	0	0.3	Topsoil or Made Ground
TG40SE43	0.3	6	Upper Clay (Breydon Formation)
TG40SE44	0	0.2	Upper Peat (Breydon Formation)
TG40SE44	0.2	5.7	Upper Clay (Breydon Formation)
TG40SE44	5.7	6	Middle Peat (Breydon Formation)
TG40SE45	0	0.3	Upper Peat (Breydon Formation)
TG40SE45	0.3	4.55	Upper Clay (Breydon Formation)
TG40SE45	4.55	5	Middle Peat (Breydon Formation)
TG40SE46	0	0.2	Topsoil or Made Ground
TG40SE46	0.2	5	Upper Clay (Breydon Formation)
TG40SE47	0	0.3	Upper Peat (Breydon Formation)
TG40SE47	0.3	3.35	Upper Clay (Breydon Formation)
TG40SE47	3.35	4	Middle Peat (Breydon Formation)
TG40SE48	0	0.2	Upper Peat (Breydon Formation)
TG40SE48	0.2	4.55	Upper Clay (Breydon Formation)
TG40SE48	4.55	5	Middle Peat (Breydon Formation)
TG40SE49	0	0.45	Topsoil or Made Ground
TG40SE49	0.45	3.5	Upper Clay (Breydon Formation)

TG40SE49	3.5	4	Middle Peat (Breydon Formation)
TG40SE5	0	5.7	Upper Clay (Breydon Formation)
TG40SE5	5.7	6.2	Middle Peat (Breydon Formation)
TG40SE50	0	0.2	Topsoil or Made Ground
TG40SE50	0.2	4.65	Upper Clay (Breydon Formation)
TG40SE50	4.65	5	Middle Peat (Breydon Formation)
TG40SE51	0	3.5	Upper Clay (Breydon Formation)
TG40SE51	3.5	4	Middle Peat (Breydon Formation)
TG40SE52	0	0.2	Topsoil or Made Ground
TG40SE52	0.2	4.9	Upper Clay (Breydon Formation)
TG40SE52	4.9	5.6	Middle Peat (Breydon Formation)
TG40SE53	0	0.2	Topsoil or Made Ground
TG40SE53	0.2	4.1	Upper Clay (Breydon Formation)
TG40SE53	4.1	4.5	Middle Peat (Breydon Formation)
TG40SE54	0	0.2	Upper Peat (Breydon Formation)
TG40SE54	0.2	3.65	Upper Clay (Breydon Formation)
TG40SE54	3.65	4	Middle Peat (Breydon Formation)
TG40SE55	0	0.3	Topsoil or Made Ground
TG40SE55	0.3	6	Upper Clay (Breydon Formation)
TG40SE56	0	0.2	Topsoil or Made Ground
TG40SE56	0.2	6	Upper Clay (Breydon Formation)
TG40SE57	0	0.3	Topsoil or Made Ground
TG40SE57	0.3	5	Upper Clay (Breydon Formation)
TG40SE58	0	0.3	Topsoil or Made Ground
TG40SE58	0.3	5.7	Upper Clay (Breydon Formation)
TG40SE59	0	0.2	Topsoil or Made Ground
TG40SE59	0.2	3.75	Upper Clay (Breydon Formation)
TG40SE59	3.75	4	Middle Peat (Breydon Formation)
TG40SE6	0	4.6	Upper Clay (Breydon Formation)
TG40SE6	4.6	5.1	Middle Peat (Breydon Formation)
TG40SE60	0	1.2	Topsoil or Made Ground
TG40SE60	1.2	5.44	Upper Clay (Breydon Formation)
TG40SE61	0	0.3	Topsoil or Made Ground
TG40SE61	0.3	6	Upper Clay (Breydon Formation)
TG40SE62	0	1.25	Upper Clay (Breydon Formation)
TG40SE62	1.25	4	Middle Peat (Breydon Formation)
TG40SE63	0	2.4	Upper Clay (Breydon Formation)
TG40SE63	2.4	3.4	Middle Peat (Breydon Formation)
TG40SE64	0	3.6	Upper Clay (Breydon Formation)
TG40SE64	3.6	3.8	Middle Peat (Breydon Formation)
TG40SE65	0	4	Upper Clay (Breydon Formation)
TG40SE66	0	0.3	Topsoil or Made Ground
TG40SE66	0.3	3.1	Upper Clay (Breydon Formation)
TG40SE66	3.1	4.9	Middle Peat (Breydon Formation)

TG40SE67	0	0.2	Upper Peat (Breydon Formation)
TG40SE67	0.2	3.2	Upper Clay (Breydon Formation)
TG40SE67	3.2	4	Middle Peat (Breydon Formation)
TG40SE68	0	0.2	Upper Peat (Breydon Formation)
TG40SE68	0.2	3.45	Upper Clay (Breydon Formation)
TG40SE68	3.45	3.8	Middle Peat (Breydon Formation)
TG40SE69	0	0.3	Upper Peat (Breydon Formation)
TG40SE69	0.3	5.35	Upper Clay (Breydon Formation)
TG40SE69	5.35	6	Middle Peat (Breydon Formation)
TG40SE7	0	4.3	Upper Clay (Breydon Formation)
TG40SE7	4.3	4.8	Middle Peat (Breydon Formation)
TG40SE70	0	0.2	Topsoil or Made Ground
TG40SE70	0.2	5.4	Upper Clay (Breydon Formation)
TG40SE70	5.4	6	Middle Peat (Breydon Formation)
TG40SE71	0	0.2	Upper Peat (Breydon Formation)
TG40SE71	0.2	2.65	Upper Clay (Breydon Formation)
TG40SE71	2.65	3.5	Middle Peat (Breydon Formation)
TG40SE72	0	0.2	Topsoil or Made Ground
TG40SE72	0.2	4.2	Upper Clay (Breydon Formation)
TG40SE72	4.2	5	Middle Peat (Breydon Formation)
TG40SE73	0	0.2	Upper Peat (Breydon Formation)
TG40SE73	0.2	4.95	Upper Clay (Breydon Formation)
TG40SE73	4.95	6	Middle Peat (Breydon Formation)
TG40SE74	0	0.2	Topsoil or Made Ground
TG40SE74	0.2	2.65	Upper Clay (Breydon Formation)
TG40SE74	2.65	4	Middle Peat (Breydon Formation)
TG40SE75	0	0.3	Topsoil or Made Ground
TG40SE75	0.3	3.7	Upper Clay (Breydon Formation)
TG40SE75	3.7	4.5	Middle Peat (Breydon Formation)
TG40SE76	0	0.3	Upper Peat (Breydon Formation)
TG40SE76	0.3	3.45	Upper Clay (Breydon Formation)
TG40SE76	3.45	4	Middle Peat (Breydon Formation)
TG40SE77	0	0.3	Upper Peat (Breydon Formation)
TG40SE77	0.3	3.5	Upper Clay (Breydon Formation)
TG40SE77	3.5	4	Middle Peat (Breydon Formation)
TG40SE78	0	0.3	Topsoil or Made Ground
TG40SE78	0.3	8	Upper Clay (Breydon Formation)
TG40SE79	0	0.3	Topsoil or Made Ground
TG40SE79	0.3	6	Upper Clay (Breydon Formation)
TG40SE8	0	4.2	Upper Clay (Breydon Formation)
TG40SE8	4.2	4.7	Middle Peat (Breydon Formation)
TG40SE80	0	0.3	Topsoil or Made Ground
TG40SE80	0.3	6	Upper Clay (Breydon Formation)
TG40SE81	0	2.35	Upper Clay (Breydon Formation)

TG40SE81	2.35	4	Middle Peat (Breydon Formation)
TG40SE82	0	0.4	Topsoil or Made Ground
TG40SE82	0.4	3.1	Upper Clay (Breydon Formation)
TG40SE82	3.1	4	Middle Peat (Breydon Formation)
TG40SE83	0	0.2	Topsoil or Made Ground
TG40SE83	0.2	4.3	Upper Clay (Breydon Formation)
TG40SE83	4.3	4.5	Middle Peat (Breydon Formation)
TG40SE84	0	0.3	Upper Peat (Breydon Formation)
TG40SE84	0.14	1.7	Middle Peat (Breydon Formation)
TG40SE84	0.3	1.4	Upper Clay (Breydon Formation)
TG40SE85	0	0.4	Topsoil or Made Ground
TG40SE85	0.4	3.6	Upper Clay (Breydon Formation)
TG40SE85	3.6	4	Middle Peat (Breydon Formation)
TG40SE86	0	0.2	Topsoil or Made Ground
TG40SE86	0.2	3.1	Upper Clay (Breydon Formation)
TG40SE86	3.1	4	Middle Peat (Breydon Formation)
TG40SE87	0	0.2	Topsoil or Made Ground
TG40SE87	0.2	3.65	Upper Clay (Breydon Formation)
TG40SE87	3.65	4	Middle Peat (Breydon Formation)
TG40SE88	0	0.3	Topsoil or Made Ground
TG40SE88	0.3	2.85	Upper Clay (Breydon Formation)
TG40SE88	2.85	4	Middle Peat (Breydon Formation)
TG40SE89	0	0.3	Topsoil or Made Ground
TG40SE89	0.3	3.15	Upper Clay (Breydon Formation)
TG40SE89	3.15	3.5	Middle Peat (Breydon Formation)
TG40SE9	0	4	Upper Clay (Breydon Formation)
TG40SE9	4	4.5	Middle Peat (Breydon Formation)
TG40SE90	0	0.2	Topsoil or Made Ground
TG40SE90	0.2	3.25	Upper Clay (Breydon Formation)
TG40SE90	3.25	3.5	Middle Peat (Breydon Formation)
TG40SE91	0	0.3	Upper Peat (Breydon Formation)
TG40SE91	0.3	4	Upper Clay (Breydon Formation)
TG40SE91	4	4.5	Middle Peat (Breydon Formation)
TG40SE92	0	0.3	Topsoil or Made Ground
TG40SE92	0.3	4.15	Upper Clay (Breydon Formation)
TG40SE92	4.15	4.6	Middle Peat (Breydon Formation)
TG40SE93	0	0.2	Topsoil or Made Ground
TG40SE93	0.2	3.4	Upper Clay (Breydon Formation)
TG40SE93	3.4	4	Middle Peat (Breydon Formation)
TG40SE94	0	0.2	Topsoil or Made Ground
TG40SE94	0.2	4.65	Upper Clay (Breydon Formation)
TG40SE94	4.65	5	Middle Peat (Breydon Formation)
TG40SE95	0	0.2	Upper Peat (Breydon Formation)
TG40SE95	0.2	5	Upper Clay (Breydon Formation)

TG40SW1	0	14.63	Lowestoft Till
TG40SW1	14.63	19.81	Crag (Norwich Crag and Red Crag)
TG40SW10	0	4.5	Upper Clay (Breydon Formation)
TG40SW10	4.5	5	Middle Peat (Breydon Formation)
TG40SW100 -- UEA	0	3.5	Upper Clay (Breydon Formation)
TG40SW100 -- UEA	3.5	5.8	Middle Peat (Breydon Formation)
TG40SW100 -- UEA	5.8	6.3	Lower Clay (Breydon Formation)
TG40SW101 -- UEA	0	3.2	Upper Clay (Breydon Formation)
TG40SW101 -- UEA	3.2	5.8	Middle Peat (Breydon Formation)
TG40SW101 -- UEA	5.8	6.3	Lower Clay (Breydon Formation)
TG40SW102	0	1.85	Upper Peat (Breydon Formation)
TG40SW102	1.85	2.25	Upper Clay (Breydon Formation)
TG40SW102	2.25	7	Middle Peat (Breydon Formation)
TG40SW102	7	7.3	Lower Clay (Breydon Formation)
TG40SW102	7.3	7.8	Crag (Norwich Crag and Red Crag)
TG40SW103	0	0.3	Topsoil or Made Ground
TG40SW103	0.3	3.4	Upper Clay (Breydon Formation)
TG40SW103	3.4	7.7	Middle Peat (Breydon Formation)
TG40SW103	7.7	8	Lower Clay (Breydon Formation)
TG40SW104	0	0.4	Topsoil or Made Ground
TG40SW104	0.4	4	Upper Clay (Breydon Formation)
TG40SW104	4	4.5	Middle Peat (Breydon Formation)
TG40SW105	0	1.6	Upper Peat (Breydon Formation)
TG40SW105	1.6	2.4	Upper Clay (Breydon Formation)
TG40SW105	2.4	6.25	Middle Peat (Breydon Formation)
TG40SW105	6.25	6.5	Lower Clay (Breydon Formation)
TG40SW105	6.5	6.7	Crag (Norwich Crag and Red Crag)
TG40SW106	0	0.3	Topsoil or Made Ground
TG40SW106	0.3	1.2	Upper Clay (Breydon Formation)
TG40SW106	1.2	2.4	Middle Peat (Breydon Formation)
TG40SW106	2.4	2.7	Lower Clay (Breydon Formation)
TG40SW107	0	1.35	Upper Clay (Breydon Formation)
TG40SW107	1.35	2.8	Middle Peat (Breydon Formation)
TG40SW107	2.8	3.6	Crag (Norwich Crag and Red Crag)
TG40SW108	0	1.1	Upper Clay (Breydon Formation)
TG40SW108	1.1	1.75	Middle Peat (Breydon Formation)
TG40SW108	1.75	1.85	Crag (Norwich Crag and Red Crag)
TG40SW109	0	4	Upper Clay (Breydon Formation)
TG40SW11	0	4.1	Upper Clay (Breydon Formation)
TG40SW11	4.1	4.6	Middle Peat (Breydon Formation)
TG40SW110	0	1.01	Topsoil or Made Ground
TG40SW110	1.01	4.68	Upper Clay (Breydon Formation)
TG40SW110	4.68	6.37	Middle Peat (Breydon Formation)
TG40SW110	6.37	14.2	Lower Clay (Breydon Formation)

TG40SW110	14.2	15.05	Lower Peat (Breydon Formation)
TG40SW110	15.05	15.24	Crag (Norwich Crag and Red Crag)
TG40SW111	0	1.2	Topsoil or Made Ground
TG40SW111	1.2	3.85	Upper Clay (Breydon Formation)
TG40SW111	3.85	5.6	Middle Peat (Breydon Formation)
TG40SW111	5.6	12.07	Lower Clay (Breydon Formation)
TG40SW111	12.07	12.36	Lower Peat (Breydon Formation)
TG40SW111	12.36	13	Crag (Norwich Crag and Red Crag)
TG40SW112	0	0.98	Topsoil or Made Ground
TG40SW112	0.98	4.21	Upper Clay (Breydon Formation)
TG40SW112	4.21	6.37	Middle Peat (Breydon Formation)
TG40SW112	6.37	9.81	Lower Clay (Breydon Formation)
TG40SW112	9.81	10.27	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG40SW121	0	0.8	Topsoil or Made Ground
TG40SW121	0.8	1.8	Upper Clay (Breydon Formation)
TG40SW121	1.8	4	Middle Peat (Breydon Formation)
TG40SW121	4	4.8	Lower Clay (Breydon Formation)
TG40SW121	4.8	10	Crag (Norwich Crag and Red Crag)
TG40SW122	0	0.5	Topsoil or Made Ground
TG40SW122	0.5	3	Upper Clay (Breydon Formation)
TG40SW122	3	5	Middle Peat (Breydon Formation)
TG40SW123	0	0.6	Topsoil or Made Ground
TG40SW123	0.6	2	Upper Clay (Breydon Formation)
TG40SW123	2	4	Crag (Norwich Crag and Red Crag)
TG40SW124	0	0.4	Topsoil or Made Ground
TG40SW124	0.4	2	Upper Clay (Breydon Formation)
TG40SW124	2	5	Middle Peat (Breydon Formation)
TG40SW125	0	0.5	Topsoil or Made Ground
TG40SW125	0.5	2.9	Upper Clay (Breydon Formation)
TG40SW125	2.9	4	Middle Peat (Breydon Formation)
TG40SW125	4	5	Crag (Norwich Crag and Red Crag)
TG40SW131	0	10.7	Upper Clay (Breydon Formation)
TG40SW132	0	10.95	Upper Clay (Breydon Formation)
TG40SW133	0	9	Upper Clay (Breydon Formation)
TG40SW133	9	10.7	Lower Clay (Breydon Formation)
TG40SW14	0	0.6	Upper Peat (Breydon Formation)
TG40SW14	0.6	1.4	Upper Clay (Breydon Formation)
TG40SW14	1.4	2.3	Middle Peat (Breydon Formation)
TG40SW15	0	2.7	Upper Clay (Breydon Formation)
TG40SW15	2.7	3.2	Middle Peat (Breydon Formation)
TG40SW16	0	2.8	Upper Clay (Breydon Formation)
TG40SW16	2.8	3.3	Middle Peat (Breydon Formation)
TG40SW17	0	1	Upper Peat (Breydon Formation)
TG40SW17	1	3	Upper Clay (Breydon Formation)

TG40SW17	3	5	Middle Peat (Breydon Formation)
TG40SW18	0	0.7	Upper Peat (Breydon Formation)
TG40SW18	0.7	3.7	Upper Clay (Breydon Formation)
TG40SW18	3.7	5.5	Middle Peat (Breydon Formation)
TG40SW19	0	3	Upper Clay (Breydon Formation)
TG40SW19	3	3.5	Middle Peat (Breydon Formation)
TG40SW2	0	3.66	Norwich Brickearth (brickclay component Corton Formation)
TG40SW2	3.66	7.29	Crag (Norwich Crag and Red Crag)
TG40SW2	7.29	14.63	Crag (Norwich Crag and Red Crag)
TG40SW2	14.63	18.29	London Clay
TG40SW20	0	3.9	Upper Clay (Breydon Formation)
TG40SW20	3.9	4.1	Middle Peat (Breydon Formation)
TG40SW21	0	2.9	Upper Clay (Breydon Formation)
TG40SW21	2.9	3.4	Middle Peat (Breydon Formation)
TG40SW22	0	0.5	Upper Peat (Breydon Formation)
TG40SW22	4.7	5	Upper Clay (Breydon Formation)
TG40SW22	4.7	5.5	Middle Peat (Breydon Formation)
TG40SW23	0	4.3	Upper Clay (Breydon Formation)
TG40SW23	4.3	4.8	Middle Peat (Breydon Formation)
TG40SW24 -- UEA	0	2.5	Upper Clay (Breydon Formation)
TG40SW24 -- UEA	2.5	3	Middle Peat (Breydon Formation)
TG40SW25 -- UEA	0	5.3	Upper Clay (Breydon Formation)
TG40SW25 -- UEA	5.3	5.8	Middle Peat (Breydon Formation)
TG40SW26 -- UEA	0	4.6	Upper Clay (Breydon Formation)
TG40SW26 -- UEA	4.6	5.1	Middle Peat (Breydon Formation)
TG40SW27 -- UEA	0	4.4	Upper Clay (Breydon Formation)
TG40SW27 -- UEA	4.4	4.9	Middle Peat (Breydon Formation)
TG40SW28 -- UEA	0	3.4	Upper Clay (Breydon Formation)
TG40SW28 -- UEA	3.4	3.9	Middle Peat (Breydon Formation)
TG40SW29 -- UEA	0	3.5	Upper Clay (Breydon Formation)
TG40SW29 -- UEA	3.5	4	Middle Peat (Breydon Formation)
TG40SW30 -- UEA	0	3.3	Upper Clay (Breydon Formation)
TG40SW30 -- UEA	3.3	3.8	Middle Peat (Breydon Formation)
TG40SW31 -- UEA	0	3	Upper Clay (Breydon Formation)
TG40SW31 -- UEA	3	3.5	Middle Peat (Breydon Formation)
TG40SW32 -- UEA	0	3.9	Upper Clay (Breydon Formation)
TG40SW32 -- UEA	3.9	4.4	Middle Peat (Breydon Formation)
TG40SW33 -- UEA	0	5.2	Upper Clay (Breydon Formation)
TG40SW33 -- UEA	5.2	5.7	Middle Peat (Breydon Formation)
TG40SW34 -- UEA	0	4.8	Upper Clay (Breydon Formation)
TG40SW34 -- UEA	4.8	5.3	Middle Peat (Breydon Formation)
TG40SW35 -- UEA	0	5.3	Upper Clay (Breydon Formation)
TG40SW35 -- UEA	5.3	5.8	Middle Peat (Breydon Formation)
TG40SW36 -- UEA	0	4.7	Upper Clay (Breydon Formation)

TG40SW36 -- UEA	4.7	5.2	Middle Peat (Breydon Formation)
TG40SW37 -- UEA	0	5.2	Upper Clay (Breydon Formation)
TG40SW38 -- UEA	0	10.7	Upper Clay (Breydon Formation)
TG40SW39 -- UEA	0	0.5	Upper Peat (Breydon Formation)
TG40SW39 -- UEA	0.5	2.3	Upper Clay (Breydon Formation)
TG40SW39 -- UEA	2.3	2.8	Middle Peat (Breydon Formation)
TG40SW4	0	2.2	Upper Clay (Breydon Formation)
TG40SW4	2.2	2.7	Middle Peat (Breydon Formation)
TG40SW40 -- UEA	0	0.2	Upper Peat (Breydon Formation)
TG40SW40 -- UEA	0.2	3.6	Upper Clay (Breydon Formation)
TG40SW40 -- UEA	3.6	4.1	Middle Peat (Breydon Formation)
TG40SW41 -- UEA	0	2.4	Upper Clay (Breydon Formation)
TG40SW41 -- UEA	2.4	2.9	Middle Peat (Breydon Formation)
TG40SW42 -- UEA	0	3.3	Upper Clay (Breydon Formation)
TG40SW42 -- UEA	3.3	3.8	Middle Peat (Breydon Formation)
TG40SW43 -- UEA	0	3.1	Upper Clay (Breydon Formation)
TG40SW43 -- UEA	3.1	3.6	Middle Peat (Breydon Formation)
TG40SW44 -- UEA	0	2.4	Upper Clay (Breydon Formation)
TG40SW44 -- UEA	2.4	2.9	Middle Peat (Breydon Formation)
TG40SW45 -- UEA	0	2.9	Upper Clay (Breydon Formation)
TG40SW45 -- UEA	2.9	3.4	Middle Peat (Breydon Formation)
TG40SW46 -- UEA	0	4.6	Upper Clay (Breydon Formation)
TG40SW46 -- UEA	4.6	6.1	Middle Peat (Breydon Formation)
TG40SW46 -- UEA	6.1	10.5	Lower Clay (Breydon Formation)
TG40SW47 -- UEA	0	4.5	Upper Clay (Breydon Formation)
TG40SW47 -- UEA	4.5	6	Middle Peat (Breydon Formation)
TG40SW47 -- UEA	6	10.8	Lower Clay (Breydon Formation)
TG40SW48 -- UEA	0	3.2	Upper Clay (Breydon Formation)
TG40SW48 -- UEA	3.2	5.6	Middle Peat (Breydon Formation)
TG40SW48 -- UEA	5.6	12	Lower Clay (Breydon Formation)
TG40SW49 -- UEA	0	4.1	Upper Clay (Breydon Formation)
TG40SW49 -- UEA	4.1	5.8	Middle Peat (Breydon Formation)
TG40SW49 -- UEA	5.8	6.3	Lower Clay (Breydon Formation)
TG40SW5	0	3.1	Upper Clay (Breydon Formation)
TG40SW5	3.1	3.6	Middle Peat (Breydon Formation)
TG40SW50 -- UEA	0	3.5	Upper Clay (Breydon Formation)
TG40SW50 -- UEA	3.5	5.8	Middle Peat (Breydon Formation)
TG40SW50 -- UEA	5.8	6.3	Lower Clay (Breydon Formation)
TG40SW51 -- UEA	0	5.3	Upper Clay (Breydon Formation)
TG40SW51 -- UEA	5.3	6.4	Middle Peat (Breydon Formation)
TG40SW51 -- UEA	6.4	9.3	Lower Clay (Breydon Formation)
TG40SW52 -- UEA	0	5.6	Upper Clay (Breydon Formation)
TG40SW52 -- UEA	5.6	6.1	Middle Peat (Breydon Formation)
TG40SW52 -- UEA	6.1	9.9	Lower Clay (Breydon Formation)

TG40SW53 -- UEA	0	3.6	Upper Clay (Breydon Formation)
TG40SW53 -- UEA	3.6	5.7	Middle Peat (Breydon Formation)
TG40SW53 -- UEA	5.7	11	Lower Clay (Breydon Formation)
TG40SW54 -- UEA	0	2.8	Upper Clay (Breydon Formation)
TG40SW54 -- UEA	2.8	3.6	Middle Peat (Breydon Formation)
TG40SW55 -- UEA	0	3.9	Upper Clay (Breydon Formation)
TG40SW55 -- UEA	3.9	4.5	Middle Peat (Breydon Formation)
TG40SW56 -- UEA	0	4.7	Upper Clay (Breydon Formation)
TG40SW56 -- UEA	4.7	5.1	Middle Peat (Breydon Formation)
TG40SW58 -- UEA	0	4.9	Upper Clay (Breydon Formation)
TG40SW58 -- UEA	4.9	5.4	Middle Peat (Breydon Formation)
TG40SW59	0	4.2	Upper Clay (Breydon Formation)
TG40SW59	4.2	5.6	Middle Peat (Breydon Formation)
TG40SW59	5.6	6	Lower Clay (Breydon Formation)
TG40SW6	0	2.3	Upper Clay (Breydon Formation)
TG40SW6	2.3	2.8	Middle Peat (Breydon Formation)
TG40SW60	0	4.6	Upper Clay (Breydon Formation)
TG40SW60	4.6	6.7	Middle Peat (Breydon Formation)
TG40SW60	6.7	7	Lower Clay (Breydon Formation)
TG40SW61	0	2.1	Upper Clay (Breydon Formation)
TG40SW61	2.1	5.4	Middle Peat (Breydon Formation)
TG40SW61	5.4	6	Lower Clay (Breydon Formation)
TG40SW62	0	1.7	Upper Clay (Breydon Formation)
TG40SW62	1.7	5.4	Middle Peat (Breydon Formation)
TG40SW62	5.4	6	Lower Clay (Breydon Formation)
TG40SW63	0	2.2	Upper Clay (Breydon Formation)
TG40SW63	2.2	5.4	Middle Peat (Breydon Formation)
TG40SW63	5.4	6	Lower Clay (Breydon Formation)
TG40SW64	0	2.5	Upper Clay (Breydon Formation)
TG40SW64	2.5	5.4	Middle Peat (Breydon Formation)
TG40SW64	5.4	6	Lower Clay (Breydon Formation)
TG40SW65	0	3.8	Upper Clay (Breydon Formation)
TG40SW65	3.8	5.4	Middle Peat (Breydon Formation)
TG40SW65	5.4	6	Lower Clay (Breydon Formation)
TG40SW66	0	5	Upper Clay (Breydon Formation)
TG40SW66	5	5.5	Middle Peat (Breydon Formation)
TG40SW67	0	5.3	Upper Clay (Breydon Formation)
TG40SW67	5.3	5.8	Middle Peat (Breydon Formation)
TG40SW68	0	5.6	Upper Clay (Breydon Formation)
TG40SW68	5.6	6.1	Middle Peat (Breydon Formation)
TG40SW69	0	4.9	Upper Clay (Breydon Formation)
TG40SW69	4.9	6.9	Middle Peat (Breydon Formation)
TG40SW69	6.9	7	Lower Clay (Breydon Formation)
TG40SW7	0	3	Upper Clay (Breydon Formation)

TG40SW7	3	3.5	Middle Peat (Breydon Formation)
TG40SW70	0	3.4	Upper Clay (Breydon Formation)
TG40SW70	3.4	5.7	Middle Peat (Breydon Formation)
TG40SW70	5.7	6	Lower Clay (Breydon Formation)
TG40SW71	0	2.8	Upper Clay (Breydon Formation)
TG40SW71	2.8	5.6	Middle Peat (Breydon Formation)
TG40SW71	5.6	6	Lower Clay (Breydon Formation)
TG40SW72	0	5.2	Upper Clay (Breydon Formation)
TG40SW72	5.2	5.9	Middle Peat (Breydon Formation)
TG40SW72	5.9	6	Lower Clay (Breydon Formation)
TG40SW73	0	7.8	Upper Clay (Breydon Formation)
TG40SW73	7.8	9.5	Lower Clay (Breydon Formation)
TG40SW74	0	3	Upper Clay (Breydon Formation)
TG40SW74	3	5.9	Middle Peat (Breydon Formation)
TG40SW74	5.9	6.5	Lower Clay (Breydon Formation)
TG40SW75	0	2.5	Upper Clay (Breydon Formation)
TG40SW75	2.5	6	Middle Peat (Breydon Formation)
TG40SW75	6	6.2	Lower Clay (Breydon Formation)
TG40SW76 -- UEA	0	2.4	Upper Clay (Breydon Formation)
TG40SW76 -- UEA	2.4	5.9	Middle Peat (Breydon Formation)
TG40SW76 -- UEA	5.9	6.1	Lower Peat (Breydon Formation)
TG40SW77 -- UEA	0	1.8	Upper Peat (Breydon Formation)
TG40SW77 -- UEA	1.8	11.6	Upper Clay (Breydon Formation)
TG40SW77 -- UEA	11.6	11.7	Lower Clay (Breydon Formation)
TG40SW78 -- UEA	0	9.7	Upper Clay (Breydon Formation)
TG40SW78 -- UEA	9.7	10	Lower Clay (Breydon Formation)
TG40SW79 -- UEA	0	4	Upper Clay (Breydon Formation)
TG40SW79 -- UEA	7.3	7.5	Lower Clay (Breydon Formation)
TG40SW8	0	2.5	Upper Clay (Breydon Formation)
TG40SW8	2.5	3	Middle Peat (Breydon Formation)
TG40SW80 -- UEA	0	6	Upper Clay (Breydon Formation)
TG40SW80 -- UEA	6	7	Middle Peat (Breydon Formation)
TG40SW80 -- UEA	7	7.2	Lower Clay (Breydon Formation)
TG40SW81 -- UEA	0	4.1	Upper Clay (Breydon Formation)
TG40SW81 -- UEA	4.1	6.4	Middle Peat (Breydon Formation)
TG40SW81 -- UEA	6.4	6.5	Lower Clay (Breydon Formation)
TG40SW82	0	2.9	Upper Clay (Breydon Formation)
TG40SW82	2.9	5.9	Middle Peat (Breydon Formation)
TG40SW82	5.9	6	Lower Clay (Breydon Formation)
TG40SW83	0	2.1	Upper Clay (Breydon Formation)
TG40SW83	2.1	5.4	Middle Peat (Breydon Formation)
TG40SW83	5.4	6	Lower Clay (Breydon Formation)
TG40SW84	0	2.1	Upper Clay (Breydon Formation)
TG40SW84	2.1	2.4	Middle Peat (Breydon Formation)

TG40SW85	0	2.6	Upper Clay (Breydon Formation)
TG40SW85	2.6	8.7	Lower Clay (Breydon Formation)
TG40SW85	8.7	8.8	Corton Beds
TG40SW86	0	2.3	Upper Clay (Breydon Formation)
TG40SW86	2.3	3	Middle Peat (Breydon Formation)
TG40SW87	0	3.2	Upper Clay (Breydon Formation)
TG40SW87	3.2	4	Middle Peat (Breydon Formation)
TG40SW88	3.6	3.6	Upper Clay (Breydon Formation)
TG40SW88	3.6	4	Middle Peat (Breydon Formation)
TG40SW89	0	5.9	Upper Clay (Breydon Formation)
TG40SW89	5.9	6.1	Middle Peat (Breydon Formation)
TG40SW89	6.1	6.3	Lower Clay (Breydon Formation)
TG40SW9	0	3.8	Middle Peat (Breydon Formation)
TG40SW90	0	4.8	Upper Clay (Breydon Formation)
TG40SW90	4.8	7	Lower Peat (Breydon Formation)
TG40SW90	7	7.2	Lower Clay (Breydon Formation)
TG40SW91	0	9.6	Upper Clay (Breydon Formation)
TG40SW92	0	5.6	Upper Clay (Breydon Formation)
TG40SW92	5.6	7	Middle Peat (Breydon Formation)
TG40SW92	7	7.1	Lower Clay (Breydon Formation)
TG40SW93	0	4.9	Upper Clay (Breydon Formation)
TG40SW93	4.9	7	Middle Peat (Breydon Formation)
TG40SW93	7	7.1	Lower Clay (Breydon Formation)
TG40SW94 -- UEA	0	4.5	Upper Clay (Breydon Formation)
TG40SW94 -- UEA	4.5	6	Middle Peat (Breydon Formation)
TG40SW94 -- UEA	6	6.5	Lower Clay (Breydon Formation)
TG40SW95 -- UEA	0	14.1	Upper Clay (Breydon Formation)
TG40SW96 -- UEA	0	3.3	Upper Clay (Breydon Formation)
TG40SW96 -- UEA	3.3	5.9	Middle Peat (Breydon Formation)
TG40SW96 -- UEA	5.9	6.4	Lower Clay (Breydon Formation)
TG40SW97 -- UEA	0	3.2	Upper Clay (Breydon Formation)
TG40SW97 -- UEA	3.2	5.4	Middle Peat (Breydon Formation)
TG40SW97 -- UEA	5.4	5.9	Lower Clay (Breydon Formation)
TG40SW98 -- UEA	0	2.8	Upper Clay (Breydon Formation)
TG40SW98 -- UEA	2.8	5.4	Middle Peat (Breydon Formation)
TG40SW98 -- UEA	5.4	5.9	Lower Clay (Breydon Formation)
TG40SW99 -- UEA	0	3.6	Upper Clay (Breydon Formation)
TG40SW99 -- UEA	3.6	5.8	Middle Peat (Breydon Formation)
TG40SW99 -- UEA	5.8	6.3	Lower Clay (Breydon Formation)
TG50NW1	0	1.22	Topsoil or Made Ground
TG50NW1	1.22	6.1	Upper Clay (Breydon Formation)
TG50NW1	6.1	12.19	Corton Beds
TG50NW10	0	0.92	Topsoil or Made Ground
TG50NW10	0.92	9.23	Corton Beds

TG50NW10	9.23	13.29	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW1001	0	9.14	Crag (Norwich Crag and Red Crag)
TG50NW1002	0	0.3	Topsoil or Made Ground
TG50NW1002	0.3	3.04	Upper Clay (Breydon Formation)
TG50NW1002	3.04	6.71	Middle Peat (Breydon Formation)
TG50NW1002	6.71	16.76	Lower Clay (Breydon Formation)
TG50NW1002	16.76	20.3	Crag (Norwich Crag and Red Crag)
TG50NW1003	0	0.91	Topsoil or Made Ground
TG50NW1003	0.91	5.49	Upper Clay (Breydon Formation)
TG50NW1003	5.49	9.14	Corton Beds
TG50NW1003	9.14	13.29	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW1005	0	0.31	Topsoil or Made Ground
TG50NW1005	0.31	1.23	Upper Clay (Breydon Formation)
TG50NW1005	1.23	4.88	Middle Peat (Breydon Formation)
TG50NW1005	4.88	8.53	Lower Clay (Breydon Formation)
TG50NW1005	8.53	17.07	Corton Beds
TG50NW1005	17.07	20.12	Crag (Norwich Crag and Red Crag)
TG50NW1006	0	0.31	Topsoil or Made Ground
TG50NW1006	0.31	1.83	Upper Clay (Breydon Formation)
TG50NW1006	1.83	4.88	Middle Peat (Breydon Formation)
TG50NW1006	4.88	9.14	Lower Clay (Breydon Formation)
TG50NW1006	9.14	17.76	Crag (Norwich Crag and Red Crag)
TG50NW1011	0	1.83	Topsoil or Made Ground
TG50NW1011	1.83	4.27	Upper Clay (Breydon Formation)
TG50NW1011	4.27	9.45	Middle Peat (Breydon Formation)
TG50NW1011	9.45	17.07	Corton Beds
TG50NW1012	0	0.46	Topsoil or Made Ground
TG50NW1012	0.46	3.28	Upper Clay (Breydon Formation)
TG50NW1012	3.28	3.66	Middle Peat (Breydon Formation)
TG50NW1012	3.66	6.55	Lower Clay (Breydon Formation)
TG50NW1012	6.55	6.89	Lower Peat (Breydon Formation)
TG50NW1017	0	4.88	Crag (Norwich Crag and Red Crag)
TG50NW1019	0	19.8	Crag (Norwich Crag and Red Crag)
TG50NW1021	0	9.14	Crag (Norwich Crag and Red Crag)
TG50NW1022	0	15.24	Corton Beds
TG50NW1022	15.24	50.6	Crag (Norwich Crag and Red Crag)
TG50NW1022	50.6	53.19	London Clay
TG50NW1026	0	0.91	Topsoil or Made Ground
TG50NW1026	0.91	1.37	Upper Clay (Breydon Formation)
TG50NW1026	1.37	4.88	Middle Peat (Breydon Formation)
TG50NW1026	4.88	8.53	Lower Clay (Breydon Formation)
TG50NW1026	8.53	17.68	Crag (Norwich Crag and Red Crag)
TG50NW1031	0	0.91	Topsoil or Made Ground

TG50NW1031	0.91	3.35	Norwich Brickearth (brickclay component Corton Formation)
TG50NW1031	3.35	15.24	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW1031	15.24	17.37	Crag (Norwich Crag and Red Crag)
TG50NW1033	0	9.75	Corton Beds
TG50NW1076	0	0.5	Topsoil or Made Ground
TG50NW1076	0.5	2.9	Upper Clay (Breydon Formation)
TG50NW1076	2.9	4.9	Middle Peat (Breydon Formation)
TG50NW1076	4.9	10.2	Lower Clay (Breydon Formation)
TG50NW1076	10.2	11.5	Lower Peat (Breydon Formation)
TG50NW1076	11.5	20.2	Crag (Norwich Crag and Red Crag)
TG50NW1077	0	1.3	Topsoil or Made Ground
TG50NW1077	1.3	5	Upper Clay (Breydon Formation)
TG50NW1077	5	7.8	Middle Peat (Breydon Formation)
TG50NW1077	7.8	23	Crag (Norwich Crag and Red Crag)
TG50NW1078	0	0.6	Topsoil or Made Ground
TG50NW1078	0.6	6.7	Upper Clay (Breydon Formation)
TG50NW1078	6.7	10.8	Middle Peat (Breydon Formation)
TG50NW1078	10.8	16.2	Crag (Norwich Crag and Red Crag)
TG50NW1079	0	1.6	Topsoil or Made Ground
TG50NW1079	1.6	6.5	Upper Clay (Breydon Formation)
TG50NW1079	6.5	10.2	Middle Peat (Breydon Formation)
TG50NW1079	10.2	17.5	Lower Clay (Breydon Formation)
TG50NW1079	17.5	18	Lower Peat (Breydon Formation)
TG50NW1079	18	18.5	Crag (Norwich Crag and Red Crag)
TG50NW1080	0	0.8	Topsoil or Made Ground
TG50NW1080	0.8	4.7	Upper Clay (Breydon Formation)
TG50NW1080	4.7	6	Middle Peat (Breydon Formation)
TG50NW1081	0	0.7	Topsoil or Made Ground
TG50NW1081	0.7	5	Upper Clay (Breydon Formation)
TG50NW1082	0	0.4	Topsoil or Made Ground
TG50NW1082	0.4	5	Upper Clay (Breydon Formation)
TG50NW1083	0	0.7	Topsoil or Made Ground
TG50NW1083	0.7	5	Upper Clay (Breydon Formation)
TG50NW1084	0	0.4	Topsoil or Made Ground
TG50NW1084	0.4	5	Upper Clay (Breydon Formation)
TG50NW117	0	0.46	Topsoil or Made Ground
TG50NW117	0.46	3.96	Upper Clay (Breydon Formation)
TG50NW122	0	1.5	Topsoil or Made Ground
TG50NW122	1.5	3.65	Upper Clay (Breydon Formation)
TG50NW123	0	0.6	Topsoil or Made Ground
TG50NW123	0.6	3	Upper Clay (Breydon Formation)
TG50NW124	0	1	Topsoil or Made Ground
TG50NW124	1	1.9	Upper Peat (Breydon Formation)

TG50NW124	1.9	3.3	Upper Clay (Breydon Formation)
TG50NW125	0	0.6	Topsoil or Made Ground
TG50NW125	0.6	3	Upper Clay (Breydon Formation)
TG50NW126	0	0.8	Topsoil or Made Ground
TG50NW126	0.8	10.5	Upper Clay (Breydon Formation)
TG50NW127	0	1.2	Topsoil or Made Ground
TG50NW127	1.2	5.6	Upper Clay (Breydon Formation)
TG50NW127	5.6	7.6	Middle Peat (Breydon Formation)
TG50NW127	7.6	10	Lower Clay (Breydon Formation)
TG50NW128	0	1.4	Topsoil or Made Ground
TG50NW128	1.4	2	Upper Peat (Breydon Formation)
TG50NW128	2	4.85	Upper Clay (Breydon Formation)
TG50NW128	4.85	7.3	Middle Peat (Breydon Formation)
TG50NW128	7.3	10	Lower Clay (Breydon Formation)
TG50NW129	0	0.8	Topsoil or Made Ground
TG50NW129	0.8	1.4	Upper Peat (Breydon Formation)
TG50NW129	1.4	3	Upper Clay (Breydon Formation)
TG50NW13	0	0.3	Topsoil or Made Ground
TG50NW13	0.3	1.23	Upper Clay (Breydon Formation)
TG50NW13	1.23	4.92	Middle Peat (Breydon Formation)
TG50NW13	4.92	7.38	Cover Sand
TG50NW13	7.38	8.61	Lowestoft Till
TG50NW13	8.61	10.76	Corton Beds
TG50NW13	10.76	17.23	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW13	17.23	20.3	Crag (Norwich Crag and Red Crag)
TG50NW130	0	1.2	Topsoil or Made Ground
TG50NW130	1.2	5	Upper Clay (Breydon Formation)
TG50NW131	0	0.6	Topsoil or Made Ground
TG50NW131	0.6	3.2	Upper Clay (Breydon Formation)
TG50NW132	0	1.7	Topsoil or Made Ground
TG50NW132	1.7	2.65	Corton Beds
TG50NW133	0	0.3	Topsoil or Made Ground
TG50NW133	0.3	2	Upper Clay (Breydon Formation)
TG50NW134	0	1	Topsoil or Made Ground
TG50NW134	1	2.27	Upper Clay (Breydon Formation)
TG50NW135	0	2	Topsoil or Made Ground
TG50NW135	2	2.27	Upper Clay (Breydon Formation)
TG50NW136	0	1.65	Topsoil or Made Ground
TG50NW136	1.65	2.5	Upper Clay (Breydon Formation)
TG50NW137	0	2	Topsoil or Made Ground
TG50NW138	0	1.8	Topsoil or Made Ground
TG50NW138	1.8	2.5	Crag (Norwich Crag and Red Crag)
TG50NW139	0	2.5	Topsoil or Made Ground
TG50NW14	0	18.3	Crag (Norwich Crag and Red Crag)

TG50NW141	0	2	Topsoil or Made Ground
TG50NW141	2	2.5	Upper Clay (Breydon Formation)
TG50NW141	2.5	7	Middle Peat (Breydon Formation)
TG50NW141	7	17	Lower Clay (Breydon Formation)
TG50NW141	17	26	Crag (Norwich Crag and Red Crag)
TG50NW143	0	7	Upper Clay (Breydon Formation)
TG50NW143	7	7.5	Middle Peat (Breydon Formation)
TG50NW143	7.5	21.5	Crag (Norwich Crag and Red Crag)
TG50NW144	0	2	Topsoil or Made Ground
TG50NW144	2	3	Upper Clay (Breydon Formation)
TG50NW144	3	12.7	Crag (Norwich Crag and Red Crag)
TG50NW145	0	0.2	Topsoil or Made Ground
TG50NW145	0.2	3.6	Upper Clay (Breydon Formation)
TG50NW145	3.6	10	Crag (Norwich Crag and Red Crag)
TG50NW146	0	0.35	Topsoil or Made Ground
TG50NW146	0.35	5.1	Upper Clay (Breydon Formation)
TG50NW146	5.1	7	Middle Peat (Breydon Formation)
TG50NW146	7	15	Lower Clay (Breydon Formation)
TG50NW147	0	0.3	Topsoil or Made Ground
TG50NW147	3	4.6	Upper Clay (Breydon Formation)
TG50NW147	4.6	7.5	Middle Peat (Breydon Formation)
TG50NW147	7.5	15	Lower Clay (Breydon Formation)
TG50NW148	0	0.1	Topsoil or Made Ground
TG50NW148	0.1	3	Upper Clay (Breydon Formation)
TG50NW149	0	1.5	Topsoil or Made Ground
TG50NW149	1.5	6	Upper Clay (Breydon Formation)
TG50NW149	6	8.3	Middle Peat (Breydon Formation)
TG50NW149	8.3	11	Lower Clay (Breydon Formation)
TG50NW161	0	24.38	Crag (Norwich Crag and Red Crag)
TG50NW162	0	36.58	Crag (Norwich Crag and Red Crag)
TG50NW163	0	1.22	Topsoil or Made Ground
TG50NW163	1.22	36.58	Crag (Norwich Crag and Red Crag)
TG50NW165	0	0.3	Topsoil or Made Ground
TG50NW165	0.3	4.57	Upper Clay (Breydon Formation)
TG50NW165	4.57	7.01	Middle Peat (Breydon Formation)
TG50NW165	7.01	11.28	Lower Clay (Breydon Formation)
TG50NW165	11.28	18.29	Crag (Norwich Crag and Red Crag)
TG50NW166	0	0.5	Topsoil or Made Ground
TG50NW166	0.5	4.57	Upper Clay (Breydon Formation)
TG50NW166	4.57	6.45	Middle Peat (Breydon Formation)
TG50NW166	6.45	10.67	Lower Clay (Breydon Formation)
TG50NW166	10.67	18.29	Crag (Norwich Crag and Red Crag)
TG50NW167	0	0.51	Topsoil or Made Ground
TG50NW167	0.51	4.57	Upper Clay (Breydon Formation)

TG50NW167	4.57	7.24	Middle Peat (Breydon Formation)
TG50NW167	7.24	15.24	Lower Clay (Breydon Formation)
TG50NW167	15.24	18.23	Crag (Norwich Crag and Red Crag)
TG50NW168	0	0.15	Topsoil or Made Ground
TG50NW168	0.15	4.42	Upper Clay (Breydon Formation)
TG50NW168	4.42	6.32	Middle Peat (Breydon Formation)
TG50NW168	6.32	15.24	Lower Clay (Breydon Formation)
TG50NW168	15.24	18.29	Crag (Norwich Crag and Red Crag)
TG50NW169	0	1.2	Topsoil or Made Ground
TG50NW169	1.2	6.1	Upper Clay (Breydon Formation)
TG50NW17/A	0	0.3	Topsoil or Made Ground
TG50NW17/A	0.3	0.6	Corton Beds
TG50NW17/A	0.6	3.8	Norwich Brickearth (brickclay component Corton Formation)
TG50NW17/A	3.8	14.76	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW17/A	14.76	17.23	Crag (Norwich Crag and Red Crag)
TG50NW17/B	0	0.76	Corton Beds
TG50NW17/B	0.76	1.84	Norwich Brickearth (brickclay component Corton Formation)
TG50NW17/B	1.84	14.15	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW17/C	0	0.92	Corton Beds
TG50NW17/C	0.92	3.38	Norwich Brickearth (brickclay component Corton Formation)
TG50NW17/C	3.38	15.38	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW17/C	15.38	17.53	Crag (Norwich Crag and Red Crag)
TG50NW170	0	0.75	Topsoil or Made Ground
TG50NW170	0.75	5.65	Upper Clay (Breydon Formation)
TG50NW170	5.65	6.1	Middle Peat (Breydon Formation)
TG50NW171	0	0.45	Topsoil or Made Ground
TG50NW171	0.45	4.55	Upper Clay (Breydon Formation)
TG50NW171	4.55	6.1	Middle Peat (Breydon Formation)
TG50NW171	6.1	7.15	Lower Clay (Breydon Formation)
TG50NW171	7.15	7.6	Lower Peat (Breydon Formation)
TG50NW172	0	0.9	Topsoil or Made Ground
TG50NW172	0.9	4.1	Upper Clay (Breydon Formation)
TG50NW172	4.1	4.55	Middle Peat (Breydon Formation)
TG50NW172	4.55	6.1	Lower Clay (Breydon Formation)
TG50NW173	0	0.15	Topsoil or Made Ground
TG50NW173	0.15	3.05	Upper Clay (Breydon Formation)
TG50NW173	3.05	4.1	Middle Peat (Breydon Formation)
TG50NW173	4.1	7.15	Lower Clay (Breydon Formation)
TG50NW173	7.15	9.15	Lower Peat (Breydon Formation)
TG50NW174	0	0.75	Topsoil or Made Ground

TG50NW174	0.75	4.1	Upper Clay (Breydon Formation)
TG50NW174	4.1	4.55	Middle Peat (Breydon Formation)
TG50NW174	4.55	9.15	Lower Clay (Breydon Formation)
TG50NW175	0	0.85	Topsoil or Made Ground
TG50NW175	0.85	4.1	Upper Clay (Breydon Formation)
TG50NW175	4.1	8.7	Middle Peat (Breydon Formation)
TG50NW175	8.7	9.15	Lower Clay (Breydon Formation)
TG50NW176	0	0.2	Topsoil or Made Ground
TG50NW176	0.2	1.05	Upper Peat (Breydon Formation)
TG50NW176	1.05	4.55	Upper Clay (Breydon Formation)
TG50NW176	4.55	8.7	Middle Peat (Breydon Formation)
TG50NW176	8.7	9.15	Lower Clay (Breydon Formation)
TG50NW177	0	0.55	Topsoil or Made Ground
TG50NW177	0.55	1.2	Upper Peat (Breydon Formation)
TG50NW177	1.2	6.1	Upper Clay (Breydon Formation)
TG50NW177	6.1	8.7	Middle Peat (Breydon Formation)
TG50NW177	8.7	9.15	Lower Clay (Breydon Formation)
TG50NW178	0	1.2	Topsoil or Made Ground
TG50NW178	1.2	3.2	Upper Clay (Breydon Formation)
TG50NW178	3.2	6.3	Middle Peat (Breydon Formation)
TG50NW178	6.3	9	Lower Clay (Breydon Formation)
TG50NW179	0	1.5	Topsoil or Made Ground
TG50NW179	1.5	3.95	Upper Clay (Breydon Formation)
TG50NW179	3.95	7	Middle Peat (Breydon Formation)
TG50NW179	7	18.3	Crag (Norwich Crag and Red Crag)
TG50NW180	0	3.65	Topsoil or Made Ground
TG50NW180	3.65	6.25	Upper Clay (Breydon Formation)
TG50NW180	6.25	9.15	Crag (Norwich Crag and Red Crag)
TG50NW181	0	1.05	Topsoil or Made Ground
TG50NW181	1.05	3.35	Upper Clay (Breydon Formation)
TG50NW181	3.35	4.55	Middle Peat (Breydon Formation)
TG50NW181	4.55	15.25	Crag (Norwich Crag and Red Crag)
TG50NW182	0	1.05	Topsoil or Made Ground
TG50NW182	1.05	3.5	Upper Clay (Breydon Formation)
TG50NW182	3.5	5.5	Middle Peat (Breydon Formation)
TG50NW182	5.5	15.25	Crag (Norwich Crag and Red Crag)
TG50NW183	0	1.07	Topsoil or Made Ground
TG50NW183	1.07	3.96	Upper Clay (Breydon Formation)
TG50NW183	3.96	5.79	Middle Peat (Breydon Formation)
TG50NW183	5.79	7.01	Lowestoft Till
TG50NW184	0	1.07	Topsoil or Made Ground
TG50NW184	1.07	2.59	Upper Clay (Breydon Formation)
TG50NW184	2.59	3.2	Middle Peat (Breydon Formation)
TG50NW184	3.2	5.18	Lowestoft Till

TG50NW184	5.18	6.86	Corton Beds
TG50NW184	6.86	7.01	Crag (Norwich Crag and Red Crag)
TG50NW187	0	1.05	Topsoil or Made Ground
TG50NW187	1.05	3.35	Terrace Gravel (Devensian)
TG50NW187	3.35	3.95	Lowestoft Till
TG50NW187	3.95	6.1	Corton Beds
TG50NW188	0	1.5	Topsoil or Made Ground
TG50NW188	1.5	12.2	Corton Beds
TG50NW189	0	0.9	Topsoil or Made Ground
TG50NW189	0.9	12.2	Crag (Norwich Crag and Red Crag)
TG50NW190	0	1.5	Topsoil or Made Ground
TG50NW191	0	1.5	Topsoil or Made Ground
TG50NW191	1.5	6.1	Crag (Norwich Crag and Red Crag)
TG50NW192	0	0.3	Topsoil or Made Ground
TG50NW192	0.3	6.1	Crag (Norwich Crag and Red Crag)
TG50NW193	0	0.3	Topsoil or Made Ground
TG50NW193	0.3	6.1	Corton Beds
TG50NW194	0	0.9	Topsoil or Made Ground
TG50NW194	0.9	6.1	Crag (Norwich Crag and Red Crag)
TG50NW195	0	0.45	Topsoil or Made Ground
TG50NW195	0.45	6.1	Crag (Norwich Crag and Red Crag)
TG50NW196	0	0.9	Topsoil or Made Ground
TG50NW196	0.9	6.1	Crag (Norwich Crag and Red Crag)
TG50NW197	0	2.45	Topsoil or Made Ground
TG50NW197	2.45	6.1	Crag (Norwich Crag and Red Crag)
TG50NW198	0	1.07	Topsoil or Made Ground
TG50NW198	1.07	12	Crag (Norwich Crag and Red Crag)
TG50NW199	0	1.83	Topsoil or Made Ground
TG50NW199	1.83	19.5	Crag (Norwich Crag and Red Crag)
TG50NW20	0	3.07	Corton Beds
TG50NW20	3.07	9.23	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW200	0	2.13	Topsoil or Made Ground
TG50NW200	2.13	13.72	Crag (Norwich Crag and Red Crag)
TG50NW201	0	0.3	Topsoil or Made Ground
TG50NW201	0.3	12.19	Crag (Norwich Crag and Red Crag)
TG50NW202	0	5.79	Topsoil or Made Ground
TG50NW202	5.79	18.29	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW204	0	6.4	Topsoil or Made Ground
TG50NW204	6.4	12.19	Corton Beds
TG50NW206	0	6.25	Topsoil or Made Ground
TG50NW206	6.25	20.24	Crag (Norwich Crag and Red Crag)
TG50NW207	0	0.69	Topsoil or Made Ground
TG50NW207	0.69	23.01	Crag (Norwich Crag and Red Crag)

TG50NW208	0	0.99	Topsoil or Made Ground
TG50NW208	0.99	27.2	Crag (Norwich Crag and Red Crag)
TG50NW209	0	0.5	Topsoil or Made Ground
TG50NW209	0.5	3.5	Upper Clay (Breydon Formation)
TG50NW209	3.5	5.9	Middle Peat (Breydon Formation)
TG50NW209	5.9	8	Lower Clay (Breydon Formation)
TG50NW209	8	8.7	Corton Beds
TG50NW209	8.7	15.25	Crag (Norwich Crag and Red Crag)
TG50NW210	0	0.5	Topsoil or Made Ground
TG50NW210	0.5	3.5	Upper Clay (Breydon Formation)
TG50NW210	3.5	4.9	Middle Peat (Breydon Formation)
TG50NW210	4.9	6.5	Lower Clay (Breydon Formation)
TG50NW210	6.5	7	Corton Beds
TG50NW210	7	18.5	Crag (Norwich Crag and Red Crag)
TG50NW227	0	1	Topsoil or Made Ground
TG50NW227	1	7	Upper Clay (Breydon Formation)
TG50NW227	7	9	Middle Peat (Breydon Formation)
TG50NW227	9	10	Lower Clay (Breydon Formation)
TG50NW227	10	11.5	Crag (Norwich Crag and Red Crag)
TG50NW228	0	0.3	Topsoil or Made Ground
TG50NW228	0.3	6	Upper Clay (Breydon Formation)
TG50NW228	6	8	Middle Peat (Breydon Formation)
TG50NW228	8	11	Lower Clay (Breydon Formation)
TG50NW228	11	11.9	Crag (Norwich Crag and Red Crag)
TG50NW229	0	0.5	Topsoil or Made Ground
TG50NW229	0.5	5	Upper Clay (Breydon Formation)
TG50NW229	5	6.9	Middle Peat (Breydon Formation)
TG50NW229	6.9	10	Lower Clay (Breydon Formation)
TG50NW23	0	9.53	Corton Beds
TG50NW231	0	0.5	Topsoil or Made Ground
TG50NW231	0.5	4.5	Upper Clay (Breydon Formation)
TG50NW231	4.5	8.5	Middle Peat (Breydon Formation)
TG50NW231	8.5	13	Lower Clay (Breydon Formation)
TG50NW231	13	14.6	Crag (Norwich Crag and Red Crag)
TG50NW232	0	0.3	Topsoil or Made Ground
TG50NW232	0.3	8.9	Upper Clay (Breydon Formation)
TG50NW232	8.9	11.6	Middle Peat (Breydon Formation)
TG50NW232	11.6	15.4	Lower Clay (Breydon Formation)
TG50NW233	0	0.3	Topsoil or Made Ground
TG50NW233	0.3	5	Upper Clay (Breydon Formation)
TG50NW233	5	7.5	Middle Peat (Breydon Formation)
TG50NW233	7.5	15.6	Lower Clay (Breydon Formation)
TG50NW235	0	0.5	Topsoil or Made Ground
TG50NW235	0.5	5.5	Upper Clay (Breydon Formation)

TG50NW235	5.5	8	Middle Peat (Breydon Formation)
TG50NW235	8	15.25	Lower Clay (Breydon Formation)
TG50NW236	0	0.3	Topsoil or Made Ground
TG50NW236	0.3	5.5	Upper Clay (Breydon Formation)
TG50NW236	5.5	7.75	Middle Peat (Breydon Formation)
TG50NW236	7.75	15.5	Lower Clay (Breydon Formation)
TG50NW236	15.5	19.4	Crag (Norwich Crag and Red Crag)
TG50NW237	0	0.5	Topsoil or Made Ground
TG50NW237	0.5	6.5	Upper Clay (Breydon Formation)
TG50NW237	6.5	8.5	Middle Peat (Breydon Formation)
TG50NW237	8.5	10.5	Lower Clay (Breydon Formation)
TG50NW237	10.5	10.8	Crag (Norwich Crag and Red Crag)
TG50NW24	0	9.53	Corton Beds
TG50NW242	0	0.5	Topsoil or Made Ground
TG50NW242	0.5	6.2	Upper Clay (Breydon Formation)
TG50NW242	6.2	7.8	Middle Peat (Breydon Formation)
TG50NW242	7.8	16.5	Lower Clay (Breydon Formation)
TG50NW242	16.5	17	Crag (Norwich Crag and Red Crag)
TG50NW243	0	0.5	Topsoil or Made Ground
TG50NW243	0.5	7.9	Upper Clay (Breydon Formation)
TG50NW243	7.9	9.5	Middle Peat (Breydon Formation)
TG50NW243	9.5	18.5	Lower Clay (Breydon Formation)
TG50NW243	18.5	22.6	Crag (Norwich Crag and Red Crag)
TG50NW244	0	1.5	Topsoil or Made Ground
TG50NW244	1.5	22	Lower Clay (Breydon Formation)
TG50NW244	22	23	Crag (Norwich Crag and Red Crag)
TG50NW25	0	9.84	Corton Beds
TG50NW250	0	0.5	Topsoil or Made Ground
TG50NW250	0.5	8	Upper Clay (Breydon Formation)
TG50NW250	8	9	Middle Peat (Breydon Formation)
TG50NW250	9	16	Lower Clay (Breydon Formation)
TG50NW250	16	16.5	Crag (Norwich Crag and Red Crag)
TG50NW253	0	0.5	Topsoil or Made Ground
TG50NW253	0.5	6	Upper Clay (Breydon Formation)
TG50NW253	6	7.9	Crag (Norwich Crag and Red Crag)
TG50NW254	0	0.5	Topsoil or Made Ground
TG50NW254	0.5	7.5	Crag (Norwich Crag and Red Crag)
TG50NW255	0	0.5	Topsoil or Made Ground
TG50NW255	0.5	22	Crag (Norwich Crag and Red Crag)
TG50NW256	0	0.5	Topsoil or Made Ground
TG50NW256	0.5	3	Upper Clay (Breydon Formation)
TG50NW256	3	7.8	Crag (Norwich Crag and Red Crag)
TG50NW257	0	0.5	Topsoil or Made Ground
TG50NW257	0.5	7.5	Crag (Norwich Crag and Red Crag)

TG50NW258	0	0.5	Topsoil or Made Ground
TG50NW258	0.5	7	Crag (Norwich Crag and Red Crag)
TG50NW29	0	0.8	Topsoil or Made Ground
TG50NW29	0.8	2.9	Upper Clay (Breydon Formation)
TG50NW29	2.9	4	Middle Peat (Breydon Formation)
TG50NW29	4	7	Lower Clay (Breydon Formation)
TG50NW29	7	10	Crag (Norwich Crag and Red Crag)
TG50NW3	0	0.61	Topsoil or Made Ground
TG50NW3	0.61	4.57	Upper Clay (Breydon Formation)
TG50NW3	4.57	6.4	Middle Peat (Breydon Formation)
TG50NW3	6.4	11.89	Corton Beds
TG50NW31	0	4.97	Topsoil or Made Ground
TG50NW31	4.97	7.3	Upper Clay (Breydon Formation)
TG50NW31	7.3	9.45	Middle Peat (Breydon Formation)
TG50NW31	9.45	10	Lower Clay (Breydon Formation)
TG50NW324	0	0.99	Topsoil or Made Ground
TG50NW324	0.99	15.24	Upper Clay (Breydon Formation)
TG50NW326	0	0.9	Topsoil or Made Ground
TG50NW326	0.9	4.4	Upper Clay (Breydon Formation)
TG50NW326	4.4	7	Middle Peat (Breydon Formation)
TG50NW326	7	14.1	Lower Clay (Breydon Formation)
TG50NW326	14.1	19	Terrace Gravel (Devensian)
TG50NW326	19	22.3	Lowestoft Till
TG50NW326	22.3	25	Crag (Norwich Crag and Red Crag)
TG50NW328	0	0.76	Topsoil or Made Ground
TG50NW328	0.76	4.88	Upper Clay (Breydon Formation)
TG50NW328	4.88	6.86	Middle Peat (Breydon Formation)
TG50NW328	6.86	10.21	Lower Clay (Breydon Formation)
TG50NW328	10.21	20.93	Lowestoft Till
TG50NW328	20.93	24.99	Crag (Norwich Crag and Red Crag)
TG50NW329	0	0.51	Topsoil or Made Ground
TG50NW329	0.51	5.33	Upper Clay (Breydon Formation)
TG50NW329	5.33	7.47	Middle Peat (Breydon Formation)
TG50NW329	7.47	10.36	Lower Clay (Breydon Formation)
TG50NW329	10.36	18.29	Crag (Norwich Crag and Red Crag)
TG50NW330	0	1.07	Topsoil or Made Ground
TG50NW330	1.07	5.33	Upper Clay (Breydon Formation)
TG50NW330	5.33	7.62	Middle Peat (Breydon Formation)
TG50NW330	7.62	10.67	Lower Clay (Breydon Formation)
TG50NW330	10.67	24.99	Crag (Norwich Crag and Red Crag)
TG50NW333	0	3.66	Topsoil or Made Ground
TG50NW333	3.66	6.09	Upper Clay (Breydon Formation)
TG50NW333	6.09	19.81	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW333	19.81	27.43	Crag (Norwich Crag and Red Crag)

TG50NW334	0	2.9	Topsoil or Made Ground
TG50NW334	2.9	6.86	Upper Clay (Breydon Formation)
TG50NW334	6.86	24.38	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW335	0	3.66	Topsoil or Made Ground
TG50NW335	3.66	5.64	Upper Clay (Breydon Formation)
TG50NW335	5.64	19.05	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW335	19.05	24.54	Crag (Norwich Crag and Red Crag)
TG50NW336	0	2.9	Topsoil or Made Ground
TG50NW336	2.9	9.14	Upper Clay (Breydon Formation)
TG50NW337	0	0.61	Topsoil or Made Ground
TG50NW337	0.61	5.49	Upper Clay (Breydon Formation)
TG50NW337	5.49	6.71	Middle Peat (Breydon Formation)
TG50NW337	6.71	12.08	Lower Clay (Breydon Formation)
TG50NW337	12.08	19.35	Crag (Norwich Crag and Red Crag)
TG50NW337	19.35	24.38	London Clay
TG50NW338	0	1.52	Topsoil or Made Ground
TG50NW338	1.52	4.72	Upper Clay (Breydon Formation)
TG50NW338	4.72	7.01	Middle Peat (Breydon Formation)
TG50NW338	7.01	10.97	Lower Clay (Breydon Formation)
TG50NW338	10.97	19.66	Crag (Norwich Crag and Red Crag)
TG50NW338	19.66	24.38	London Clay
TG50NW339	0	1.37	Topsoil or Made Ground
TG50NW339	1.37	5.49	Upper Clay (Breydon Formation)
TG50NW339	5.49	7.62	Middle Peat (Breydon Formation)
TG50NW339	7.62	11.58	Lower Clay (Breydon Formation)
TG50NW339	11.58	24.38	Crag (Norwich Crag and Red Crag)
TG50NW340	0	0.91	Topsoil or Made Ground
TG50NW340	0.91	6.71	Upper Clay (Breydon Formation)
TG50NW340	6.71	7.5	Middle Peat (Breydon Formation)
TG50NW340	7.5	10.06	Lower Clay (Breydon Formation)
TG50NW340	10.06	22.4	Crag (Norwich Crag and Red Crag)
TG50NW340	22.4	24.38	London Clay
TG50NW385	0	4	Upper Clay (Breydon Formation)
TG50NW385	4	6.5	Middle Peat (Breydon Formation)
TG50NW385	6.5	12	Crag (Norwich Crag and Red Crag)
TG50NW39	0	1	Upper Clay (Breydon Formation)
TG50NW39	1	2.2	Middle Peat (Breydon Formation)
TG50NW39	2.2	5	Lowestoft Till
TG50NW4	0	1.07	Topsoil or Made Ground
TG50NW4	1.07	2.59	Upper Clay (Breydon Formation)
TG50NW4	2.59	3.2	Middle Peat (Breydon Formation)
TG50NW4	3.2	7.01	Corton Beds
TG50NW40	0	2.4	Upper Clay (Breydon Formation)

TG50NW40	2.4	5.1	Middle Peat (Breydon Formation)
TG50NW40	5.1	6.1	Lowestoft Till
TG50NW403	0	0.5	Topsoil or Made Ground
TG50NW403	0.5	0.8	Upper Clay (Breydon Formation)
TG50NW403	0.8	4	Lowestoft Till
TG50NW403	4	4.7	Crag (Norwich Crag and Red Crag)
TG50NW404	0	1.54	Topsoil or Made Ground
TG50NW404	1.54	2	Middle Peat (Breydon Formation)
TG50NW404	2	6.3	Lower Clay (Breydon Formation)
TG50NW405	0	1.4	Upper Clay (Breydon Formation)
TG50NW405	1.4	5.2	Lower Clay (Breydon Formation)
TG50NW406	0	1.8	Topsoil or Made Ground
TG50NW406	1.8	6	Lower Clay (Breydon Formation)
TG50NW407	0	2.7	Upper Clay (Breydon Formation)
TG50NW407	2.7	4.3	Lower Clay (Breydon Formation)
TG50NW411	0	0.8	Topsoil or Made Ground
TG50NW411	0.8	8.4	Upper Clay (Breydon Formation)
TG50NW411	8.4	10.6	Middle Peat (Breydon Formation)
TG50NW411	9.1	15.2	Lower Clay (Breydon Formation)
TG50NW412	0	2.85	Topsoil or Made Ground
TG50NW412	2.85	3	Upper Peat (Breydon Formation)
TG50NW412	3	7	Upper Clay (Breydon Formation)
TG50NW412	7	8.2	Middle Peat (Breydon Formation)
TG50NW412	8.2	15	Lower Clay (Breydon Formation)
TG50NW413	0	2.8	Topsoil or Made Ground
TG50NW413	2.8	7.2	Upper Clay (Breydon Formation)
TG50NW413	7.2	8.25	Middle Peat (Breydon Formation)
TG50NW413	8.25	15	Lower Clay (Breydon Formation)
TG50NW42	0	0.65	Topsoil or Made Ground
TG50NW42	0.65	4	Upper Clay (Breydon Formation)
TG50NW42	4	7	Middle Peat (Breydon Formation)
TG50NW42	7	8	Lowestoft Till
TG50NW422	0	0.9	Topsoil or Made Ground
TG50NW422	0.9	5.2	Upper Clay (Breydon Formation)
TG50NW422	5.2	6	Middle Peat (Breydon Formation)
TG50NW423	0	6	VOID
TG50NW423	6	6.55	Middle Peat (Breydon Formation)
TG50NW423	6.55	19.2	Lower Clay (Breydon Formation)
TG50NW423	19.2	23.5	Terrace Gravel (Devensian)
TG50NW424	0	0.2	Topsoil or Made Ground
TG50NW424	0.2	5	Upper Clay (Breydon Formation)
TG50NW424	5	7	Middle Peat (Breydon Formation)
TG50NW424	7	15.05	Lower Clay (Breydon Formation)
TG50NW425	0	2.5	Topsoil or Made Ground

TG50NW425	2.5	6.7	Upper Clay (Breydon Formation)
TG50NW425	6.7	8.3	Middle Peat (Breydon Formation)
TG50NW425	8.3	15	Lower Clay (Breydon Formation)
TG50NW426	0	1.83	Topsoil or Made Ground
TG50NW426	1.83	6.1	Upper Clay (Breydon Formation)
TG50NW426	6.1	8.4	Middle Peat (Breydon Formation)
TG50NW426	8.4	20.3	Lower Clay (Breydon Formation)
TG50NW426	20.3	25	Terrace Gravel (Devensian)
TG50NW427	0	0.85	Topsoil or Made Ground
TG50NW427	0.85	6.05	Upper Clay (Breydon Formation)
TG50NW427	6.05	6.7	Middle Peat (Breydon Formation)
TG50NW427	6.7	10	Lower Clay (Breydon Formation)
TG50NW428	0	0.3	Topsoil or Made Ground
TG50NW428	0.3	5.5	Upper Clay (Breydon Formation)
TG50NW428	5.5	8.55	Middle Peat (Breydon Formation)
TG50NW428	8.55	9.8	Lower Clay (Breydon Formation)
TG50NW430	0	0.85	Topsoil or Made Ground
TG50NW430	0.85	7.5	Upper Clay (Breydon Formation)
TG50NW430	7.5	10	Middle Peat (Breydon Formation)
TG50NW431	0	0.8	Topsoil or Made Ground
TG50NW431	0.8	5.4	Upper Clay (Breydon Formation)
TG50NW431	5.4	8.5	Middle Peat (Breydon Formation)
TG50NW431	8.5	11.4	Lower Clay (Breydon Formation)
TG50NW431	11.4	12	Lower Clay (Breydon Formation)
TG50NW431	12	13	Terrace Gravel (Devensian)
TG50NW432	0	0.15	Topsoil or Made Ground
TG50NW432	0.15	4.7	Upper Clay (Breydon Formation)
TG50NW432	4.7	6.7	Middle Peat (Breydon Formation)
TG50NW432	6.7	10	Lower Clay (Breydon Formation)
TG50NW433	0	0.7	Topsoil or Made Ground
TG50NW433	0.7	5.9	Upper Clay (Breydon Formation)
TG50NW433	5.9	7.4	Middle Peat (Breydon Formation)
TG50NW433	7.4	10	Lower Clay (Breydon Formation)
TG50NW434	0	0.15	Topsoil or Made Ground
TG50NW434	0.15	4.25	Upper Clay (Breydon Formation)
TG50NW434	4.25	6.1	Middle Peat (Breydon Formation)
TG50NW434	6.1	10	Lower Clay (Breydon Formation)
TG50NW439	0	1.2	Topsoil or Made Ground
TG50NW439	1.2	6.3	Upper Clay (Breydon Formation)
TG50NW439	6.3	7.8	Middle Peat (Breydon Formation)
TG50NW439	7.8	15	Lower Clay (Breydon Formation)
TG50NW440	0	5.6	Upper Clay (Breydon Formation)
TG50NW440	5.6	8.6	Middle Peat (Breydon Formation)
TG50NW440	8.6	14.8	Lower Clay (Breydon Formation)

TG50NW441	0	1.6	Topsoil or Made Ground
TG50NW441	1.6	5.5	Upper Clay (Breydon Formation)
TG50NW441	5.5	8.2	Middle Peat (Breydon Formation)
TG50NW441	8.2	15	Lower Clay (Breydon Formation)
TG50NW442	0	2.1	Topsoil or Made Ground
TG50NW442	2.1	5.3	Upper Clay (Breydon Formation)
TG50NW442	5.3	8.6	Middle Peat (Breydon Formation)
TG50NW442	8.6	20	Lower Clay (Breydon Formation)
TG50NW442	20	21.3	Crag (Norwich Crag and Red Crag)
TG50NW443	0	0.2	Topsoil or Made Ground
TG50NW443	0.2	3.5	Upper Clay (Breydon Formation)
TG50NW444	0	0.1	Topsoil or Made Ground
TG50NW444	0.1	4.5	Upper Clay (Breydon Formation)
TG50NW445	0	0.3	Topsoil or Made Ground
TG50NW445	0.3	2.7	Upper Clay (Breydon Formation)
TG50NW456	0	0.6	Topsoil or Made Ground
TG50NW456	0.6	20	Alluvium (Composite Breydon Formation)
TG50NW456	20	35	Crag (Norwich Crag and Red Crag)
TG50NW458	0	0.6	Topsoil or Made Ground
TG50NW458	0.6	8.25	Upper Clay (Breydon Formation)
TG50NW458	8.25	9.6	Middle Peat (Breydon Formation)
TG50NW458	9.6	20.4	Lower Clay (Breydon Formation)
TG50NW458	20.4	29.8	Crag (Norwich Crag and Red Crag)
TG50NW459	0	0.8	Topsoil or Made Ground
TG50NW459	0.8	5.7	Upper Clay (Breydon Formation)
TG50NW459	5.7	7.7	Middle Peat (Breydon Formation)
TG50NW459	7.7	19.25	Lower Clay (Breydon Formation)
TG50NW459	19.25	30.5	Crag (Norwich Crag and Red Crag)
TG50NW460	0	0.25	Topsoil or Made Ground
TG50NW460	0.25	5.85	Upper Clay (Breydon Formation)
TG50NW460	5.85	7.5	Middle Peat (Breydon Formation)
TG50NW460	7.5	17.11	Lower Clay (Breydon Formation)
TG50NW460	17.11	30.5	Crag (Norwich Crag and Red Crag)
TG50NW461	0	3.5	Topsoil or Made Ground
TG50NW462	0	3.65	Topsoil or Made Ground
TG50NW463	0	4.25	Topsoil or Made Ground
TG50NW464	0	6.85	Upper Clay (Breydon Formation)
TG50NW464	6.85	7.85	Middle Peat (Breydon Formation)
TG50NW464	7.85	12.95	Lower Clay (Breydon Formation)
TG50NW465	0	0.45	Topsoil or Made Ground
TG50NW465	0.45	6.5	Upper Clay (Breydon Formation)
TG50NW465	6.5	7.9	Middle Peat (Breydon Formation)
TG50NW465	7.9	15.5	Lower Clay (Breydon Formation)
TG50NW465	15.5	15.7	Crag (Norwich Crag and Red Crag)

TG50NW466	0	0.5	Topsoil or Made Ground
TG50NW466	0.5	6.9	Upper Clay (Breydon Formation)
TG50NW466	6.9	10.3	Middle Peat (Breydon Formation)
TG50NW466	10.3	24.3	Lower Clay (Breydon Formation)
TG50NW467	0	2.5	Topsoil or Made Ground
TG50NW468	0	0.25	Topsoil or Made Ground
TG50NW468	0.25	7.3	Upper Clay (Breydon Formation)
TG50NW468	7.3	10.95	Middle Peat (Breydon Formation)
TG50NW468	10.95	23.2	Crag (Norwich Crag and Red Crag)
TG50NW469	0	0.25	Topsoil or Made Ground
TG50NW469	0.25	4.8	Upper Clay (Breydon Formation)
TG50NW469	4.8	6	Middle Peat (Breydon Formation)
TG50NW470	0	0.2	Topsoil or Made Ground
TG50NW470	0.2	6	Upper Clay (Breydon Formation)
TG50NW471	0	0.6	Topsoil or Made Ground
TG50NW471	0.6	4.5	Upper Clay (Breydon Formation)
TG50NW473	0	10	Upper Clay (Breydon Formation)
TG50NW474	0	25	Alluvium (Composite Breydon Formation)
TG50NW474	25	36	Crag (Norwich Crag and Red Crag)
TG50NW479	0	18	Upper Clay (Breydon Formation)
TG50NW479	18	30	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW481	0	15.8	Upper Clay (Breydon Formation)
TG50NW481	15.8	23	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW482	0	13.05	Alluvium (Composite Breydon Formation)
TG50NW482	13.05	23.85	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW482	23.85	30.9	Crag (Norwich Crag and Red Crag)
TG50NW483	0	13.8	Alluvium (Composite Breydon Formation)
TG50NW483	13	24.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW483	24.4	31	Crag (Norwich Crag and Red Crag)
TG50NW484	0	14.2	Upper Clay (Breydon Formation)
TG50NW484	14.2	14.4	Lower Peat (Breydon Formation)
TG50NW484	14.4	23.7	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW484	23.7	30	Crag (Norwich Crag and Red Crag)
TG50NW485	0	13.85	Upper Clay (Breydon Formation)
TG50NW485	13.85	14	Lower Peat (Breydon Formation)
TG50NW485	14	25.85	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW485	25.5	30	Crag (Norwich Crag and Red Crag)

TG50NW486	0	14.6	Upper Clay (Breydon Formation)
TG50NW486	14.6	23.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW486	23.4	30.5	Crag (Norwich Crag and Red Crag)
TG50NW487	0	14.4	Upper Clay (Breydon Formation)
TG50NW487	14.4	14.6	Lower Peat (Breydon Formation)
TG50NW487	14.6	24	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW487	24	30.5	Crag (Norwich Crag and Red Crag)
TG50NW488	0	16.3	Upper Clay (Breydon Formation)
TG50NW488	16.3	26	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW488	26	34	Crag (Norwich Crag and Red Crag)
TG50NW489	0	17.8	Upper Clay (Breydon Formation)
TG50NW489	17.8	28.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW489	28.4	34	Crag (Norwich Crag and Red Crag)
TG50NW544	0	0.3	Topsoil or Made Ground
TG50NW544	0.3	0.6	Upper Peat (Breydon Formation)
TG50NW544	0.6	4.9	Upper Clay (Breydon Formation)
TG50NW544	4.9	5.35	Middle Peat (Breydon Formation)
TG50NW544	5.35	17.75	Lower Clay (Breydon Formation)
TG50NW544	17.75	30	Crag (Norwich Crag and Red Crag)
TG50NW554	0	0.3	Topsoil or Made Ground
TG50NW554	0.3	4.9	Upper Clay (Breydon Formation)
TG50NW554	4.9	5.35	Middle Peat (Breydon Formation)
TG50NW554	5.35	17.75	Lower Clay (Breydon Formation)
TG50NW554	17.75	25.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW554	25.4	30	Crag (Norwich Crag and Red Crag)
TG50NW555	0	3.2	Topsoil or Made Ground
TG50NW555	3.2	10.45	Upper Clay (Breydon Formation)
TG50NW555	10.45	19.3	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW555	19.3	30	Crag (Norwich Crag and Red Crag)
TG50NW556	0	2.6	Topsoil or Made Ground
TG50NW556	2.6	4.8	Upper Clay (Breydon Formation)
TG50NW556	4.8	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW557	0	1.5	Topsoil or Made Ground
TG50NW558	0	2.65	Topsoil or Made Ground
TG50NW558	2.65	5.2	Upper Clay (Breydon Formation)
TG50NW558	5.2	23.2	Lowestoft Till
TG50NW558	23.2	24.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW558	24.4	30	Crag (Norwich Crag and Red Crag)

TG50NW559	0	2.4	Topsoil or Made Ground
TG50NW559	2.4	4.2	Upper Clay (Breydon Formation)
TG50NW559	4.2	10	Lowestoft Till
TG50NW560	0	1.7	Topsoil or Made Ground
TG50NW560	1.7	3.3	Upper Clay (Breydon Formation)
TG50NW560	3.3	10	Lowestoft Till
TG50NW593	0	3.5	Topsoil or Made Ground
TG50NW593	3.5	6	Cover Sand
TG50NW593	6	15.3	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW594	0	4	Topsoil or Made Ground
TG50NW594	4	5.8	Cover Sand
TG50NW594	5.8	8	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW595	0	16	Corton Beds
TG50NW596	0	2.3	Topsoil or Made Ground
TG50NW596	2.3	6.3	Cover Sand
TG50NW596	6.3	15	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW597	0	3.5	Topsoil or Made Ground
TG50NW598	0	3	Topsoil or Made Ground
TG50NW598	3	3.5	Cover Sand
TG50NW599	0	1.5	Topsoil or Made Ground
TG50NW599	1.5	3.2	Cover Sand
TG50NW600	0	0.5	Topsoil or Made Ground
TG50NW600	0.5	1	Upper Clay (Breydon Formation)
TG50NW600	1	2.5	Cover Sand
TG50NW601	0	1.2	Topsoil or Made Ground
TG50NW601	1.2	2.8	Cover Sand
TG50NW602	0	1	Topsoil or Made Ground
TG50NW602	1	2.5	Cover Sand
TG50NW603	0	1.8	Topsoil or Made Ground
TG50NW603	1.8	4.8	Upper Clay (Breydon Formation)
TG50NW603	4.8	10	Middle Peat (Breydon Formation)
TG50NW603	10	20	Lower Clay (Breydon Formation)
TG50NW603	20	27	Terrace Gravel (Devensian)
TG50NW603	27	30	Crag (Norwich Crag and Red Crag)
TG50NW604	0	1.2	Topsoil or Made Ground
TG50NW604	1.2	6	Upper Clay (Breydon Formation)
TG50NW604	6	8	Middle Peat (Breydon Formation)
TG50NW604	8	20	Lower Clay (Breydon Formation)
TG50NW604	20	20.5	Terrace Gravel (Devensian)
TG50NW605	0	5.6	Topsoil or Made Ground
TG50NW605	5.6	7	Upper Clay (Breydon Formation)
TG50NW605	7	8.3	Middle Peat (Breydon Formation)

TG50NW605	8.3	20.5	Lower Clay (Breydon Formation)
TG50NW605	20.5	25	Terrace Gravel (Devensian)
TG50NW606	0	2	Topsoil or Made Ground
TG50NW606	2	6	Upper Clay (Breydon Formation)
TG50NW606	6	7	Middle Peat (Breydon Formation)
TG50NW606	7	20	Lower Clay (Breydon Formation)
TG50NW606	20	30.5	Crag (Norwich Crag and Red Crag)
TG50NW623	0	0.3	Topsoil or Made Ground
TG50NW623	0.3	4	Upper Clay (Breydon Formation)
TG50NW627	0	1.2	Upper Clay (Breydon Formation)
TG50NW627	1.2	1.5	Middle Peat (Breydon Formation)
TG50NW627	1.5	4	Lower Clay (Breydon Formation)
TG50NW628	0	0.2	Topsoil or Made Ground
TG50NW628	0.2	4	Upper Clay (Breydon Formation)
TG50NW638	0	0.2	Topsoil or Made Ground
TG50NW638	0.2	4	Upper Clay (Breydon Formation)
TG50NW684	0	4	Upper Clay (Breydon Formation)
TG50NW693	0	0.5	Topsoil or Made Ground
TG50NW693	0.5	3	Upper Clay (Breydon Formation)
TG50NW710	0	0.2	Topsoil or Made Ground
TG50NW710	0.2	1.2	Upper Clay (Breydon Formation)
TG50NW713	0	1.2	Upper Clay (Breydon Formation)
TG50NW714	0	2.5	Upper Clay (Breydon Formation)
TG50NW715	0	2.9	Upper Clay (Breydon Formation)
TG50NW716	0	1.9	Upper Clay (Breydon Formation)
TG50NW718	0	3.4	Upper Clay (Breydon Formation)
TG50NW719	0	5.9	Upper Clay (Breydon Formation)
TG50NW745	0	2.15	Upper Clay (Breydon Formation)
TG50NW745	2.15	4.34	Terrace Gravel (Devensian)
TG50NW746	0	0.2	Topsoil or Made Ground
TG50NW746	0.2	4.91	Upper Clay (Breydon Formation)
TG50NW746	4.91	6.36	Terrace Gravel (Devensian)
TG50NW779	0	3.9	Upper Clay (Breydon Formation)
TG50NW779	3.9	10	Terrace Gravel (Devensian)
TG50NW780	0	1	Topsoil or Made Ground
TG50NW780	1	6.71	Upper Clay (Breydon Formation)
TG50NW781	0	1	Topsoil or Made Ground
TG50NW781	1	7.5	Upper Clay (Breydon Formation)
TG50NW781	7.5	8.1	Middle Peat (Breydon Formation)
TG50NW781	8.1	20	Lower Clay (Breydon Formation)
TG50NW781	20	30	Crag (Norwich Crag and Red Crag)
TG50NW8/A	0	2	Topsoil or Made Ground
TG50NW8/A	2	11	Lowestoft Till
TG50NW8/A	11	30.5	Corton Beds

TG50NW8/B	0	13	Corton Beds
TG50NW8/B	13	20.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW8/C	0	1	Topsoil or Made Ground
TG50NW8/C	1	10.3	Crag (Norwich Crag and Red Crag)
TG50NW9	0	1.84	Topsoil or Made Ground
TG50NW9	1.84	4.3	Upper Clay (Breydon Formation)
TG50NW9	4.3	9.53	Middle Peat (Breydon Formation)
TG50NW9	9.53	17.23	Crag (Norwich Crag and Red Crag)
TG50NW948	0	1.5	Topsoil or Made Ground
TG50NW948	1.5	4.8	Upper Clay (Breydon Formation)
TG50NW948	4.8	6	Middle Peat (Breydon Formation)
TG50NW948	6	18	Lower Clay (Breydon Formation)
TG50NW948	18	19.2	Crag (Norwich Crag and Red Crag)
TG50NW949	0	1	Topsoil or Made Ground
TG50NW949	1	4.2	Upper Clay (Breydon Formation)
TG50NW949	4.2	7.2	Middle Peat (Breydon Formation)
TG50NW949	7.2	19.4	Lower Clay (Breydon Formation)
TG50NW949	19.4	20	Crag (Norwich Crag and Red Crag)
TG50NW950	0	0.9	Topsoil or Made Ground
TG50NW950	0.9	5.6	Upper Clay (Breydon Formation)
TG50NW950	5.6	7.2	Middle Peat (Breydon Formation)
TG50NW950	7.2	10.5	Lower Clay (Breydon Formation)
TG50NW951	0	0.2	Topsoil or Made Ground
TG50NW951	0.2	17.1	Upper Clay (Breydon Formation)
TG50NW951	17.1	19.3	Crag (Norwich Crag and Red Crag)
TG50NW951	19.3	20.15	London Clay
TG50NW952	0	0.35	Topsoil or Made Ground
TG50NW952	0.35	4.2	Upper Clay (Breydon Formation)
TG50NW952	4.2	5.2	Middle Peat (Breydon Formation)
TG50NW952	5.2	10	Lower Clay (Breydon Formation)
TG50NW953	0	0.6	Topsoil or Made Ground
TG50NW953	0.6	10	Upper Clay (Breydon Formation)
TG50NW954	0	0.3	Topsoil or Made Ground
TG50NW954	0.3	5.15	Upper Clay (Breydon Formation)
TG50NW954	5.15	6.65	Middle Peat (Breydon Formation)
TG50NW954	6.65	10	Lower Clay (Breydon Formation)
TG50NW955	0	0.35	Topsoil or Made Ground
TG50NW955	0.35	3.5	Upper Clay (Breydon Formation)
TG50NW955	3.5	5	Middle Peat (Breydon Formation)
TG50NW955	5	10.45	Lower Clay (Breydon Formation)
TG50NW956	0	0.3	Topsoil or Made Ground
TG50NW956	0.3	5.1	Upper Clay (Breydon Formation)
TG50NW956	5.1	6.8	Middle Peat (Breydon Formation)
TG50NW956	6.8	10	Lower Clay (Breydon Formation)

TG50NW957	0	0.5	Topsoil or Made Ground
TG50NW957	0.5	3.55	Upper Clay (Breydon Formation)
TG50NW957	3.55	4.45	Middle Peat (Breydon Formation)
TG50NW957	4.45	10	Lower Clay (Breydon Formation)
TG50NW981	0	2.1	Topsoil or Made Ground
TG50NW981	2.1	6.1	Upper Clay (Breydon Formation)
TG50NW981	6.1	18.3	Lower Clay (Breydon Formation)
TG50NW981	18.3	18.7	Lower Peat (Breydon Formation)
TG50NW981	18.7	20	Crag (Norwich Crag and Red Crag)
TG50NW982	0	2.1	Topsoil or Made Ground
TG50NW982	2.1	6.1	Upper Clay (Breydon Formation)
TG50NW982	6.1	10	Lower Clay (Breydon Formation)
TG50NW983	0	2.2	Topsoil or Made Ground
TG50NW983	2.2	6.4	Upper Clay (Breydon Formation)
TG50NW983	6.4	27.2	Crag (Norwich Crag and Red Crag)
TG50NW984	0	0.9	Topsoil or Made Ground
TG50NW984	0.9	9	Upper Clay (Breydon Formation)
TG50NW984	9	20.4	Lower Clay (Breydon Formation)
TG50NW984	20.4	21.6	Crag (Norwich Crag and Red Crag)
TG50NW984	21.6	25	London Clay
TG50NW985	0	0.8	Topsoil or Made Ground
TG50NW985	0.8	6	Upper Clay (Breydon Formation)
TG50NW985	6	18.3	Lower Clay (Breydon Formation)
TG50NW985	18.3	20.5	Crag (Norwich Crag and Red Crag)
TG50NW985	20.5	25	London Clay
TG50NW996	0	9.45	Lowestoft Till
TG50NW998	0	0.32	Topsoil or Made Ground
TG50NW998	0.32	0.64	Corton Beds
TG50NW998	0.64	3.35	Norwich Brickearth (brickclay component Corton Formation)
TG50NW998	3.35	14.63	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TG50NW998	14.63	17.07	Crag (Norwich Crag and Red Crag)
TG50NW999	0	0.76	Topsoil or Made Ground
TG50NW999	0.76	1.07	Norwich Brickearth (brickclay component Corton Formation)
TG50NW999	1.07	14	Crag (Norwich Crag and Red Crag)
TG50SW1	0	0.3	Topsoil or Made Ground
TG50SW1	0.3	13.72	Lowestoft Till
TG50SW118	0	2	Topsoil or Made Ground
TG50SW118	2	12	Middle Peat (Breydon Formation)
TG50SW118	12	20	Lowestoft Till
TG50SW119	0	0.46	Topsoil or Made Ground
TG50SW119	0.46	8.53	Corton Beds
TG50SW119	8.53	15.24	Crag (Norwich Crag and Red Crag)

TG50SW180	0	8	Corton Beds
TG50SW181	0	7.32	Corton Beds
TG50SW181	7.32	8	Crag (Norwich Crag and Red Crag)
TG50SW182	0	8	Corton Beds
TG50SW183	0	7	Corton Beds
TG50SW184	0	7	Corton Beds
TG50SW185	0	7	Corton Beds
TG50SW190	0	1.2	Alluvium (Composite Breydon Formation)
TG50SW190	1.2	16.5	Crag (Norwich Crag and Red Crag)
TG50SW191	0	3.7	Alluvium (Composite Breydon Formation)
TG50SW191	3.7	30.5	Crag (Norwich Crag and Red Crag)
TG50SW2A	0	1	Lowestoft Till
TG50SW2A	1	10.95	Corton Beds
TG50SW2B	0	1.25	Lowestoft Till
TG50SW2B	1.25	18.4	Corton Beds
TG50SW2C	0	1.2	Lowestoft Till
TG50SW2C	1.2	11.05	Corton Beds
TG50SW39	0	6	Topsoil or Made Ground
TG50SW39	6	13	Corton Beds
TG50SW4	0	0.61	Topsoil or Made Ground
TG50SW4	0.61	27.5	Corton Beds
TG50SW42	0	0.5	Topsoil or Made Ground
TG50SW42	0.5	16	Corton Beds
TG50SW43	0	0.3	Topsoil or Made Ground
TG50SW43	0.3	18	Corton Beds
TG50SW43	18	19	Crag (Norwich Crag and Red Crag)
TG50SW44	0	0.25	Topsoil or Made Ground
TG50SW44	0.25	19	Corton Beds
TG50SW45	0	0.25	Topsoil or Made Ground
TG50SW45	0.25	19	Corton Beds
TG50SW5	0	3.66	Corton Beds
TG50SW7	0	25	Lowestoft Till
TG50SW7	25	25.3	London Clay
Thurlton Marshes 1	0	2.45	Upper Clay (Breydon Formation)
Thurlton Marshes 1	2.45	3.45	Middle Peat (Breydon Formation)
Thurlton Marshes 1	3.45	15.8	Lower Clay (Breydon Formation)
Thurlton Marshes 1	15.8	17.55	Crag (Norwich Crag and Red Crag)
Thurlton Marshes 2	0	2.5	Upper Clay (Breydon Formation)
Thurlton Marshes 2	2.5	6.05	Middle Peat (Breydon Formation)
Thurlton Marshes 2	6.05	15.2	Lower Clay (Breydon Formation)
Thurlton Marshes 2	15.2	15.8	Lower Peat (Breydon Formation)
Thurlton Marshes 2	15.8	17.55	Crag (Norwich Crag and Red Crag)
Thurlton Marshes 3	0	4.9	Upper Clay (Breydon Formation)

Thurlton Marshes 3	4.9	6.75	Middle Peat (Breydon Formation)
Thurlton Marshes 3	6.75	14.6	Lower Clay (Breydon Formation)
Thurlton Marshes 3	14.6	15.8	Lower Peat (Breydon Formation)
Thurlton Marshes 3	15.8	17.6	Crag (Norwich Crag and Red Crag)
TM39SE17	0	1.52	Lowestoft Till
TM39SE17	1.52	15.24	Lowestoft Till
TM39SE17	15.24	46.02	Crag (Norwich Crag and Red Crag)
TM39SE17	46.02	64	Upper Chalk
TM39SE30	0	3.35	Terrace Gravel (Devensian)
TM39SE30	3.35	10.06	Lowestoft Till
TM39SE30	10.06	10.97	Corton Beds
TM39SE30	10.97	15.24	Lowestoft Till
TM39SE30	15.24	31.7	Crag (Norwich Crag and Red Crag)
TM39SE30	31.7	50.3	Upper Chalk
TM39SE97	0	3.35	Terrace Gravel (Devensian)
TM39SE97	3.35	15.24	Lowestoft Till
TM39SE97	15.24	31.7	Crag (Norwich Crag and Red Crag)
TM39SE97	31.7	50.29	Upper Chalk
TM48NE10	0	6.5	Corton Beds
TM48NE10	6.5	9	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48NE11	0	1	Lowestoft Till
TM48NE11	1	4.6	Corton Beds
TM48NE11	4.6	7.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48NE13	0	3	Lowestoft Till
TM48NE13	3	6.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48NE14	0	4.5	Lowestoft Till
TM48NE14	0	6.1	Corton Beds
TM48NE15	0	3.7	Lowestoft Till
TM48NE15	3.7	6	Corton Beds
TM48NE17	0	2	Lowestoft Till
TM48NE17	2	6.1	Corton Beds
TM48NE23	0	1.5	Lowestoft Till
TM48NE23	1.5	5.2	Corton Beds
TM48NE23	5.2	6.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48NE8	0	2.9	Lowestoft Till
TM48NE8	2.9	6	Corton Beds
TM48NE8	6	8.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48NE8	8.4	10	Crag (Norwich Crag and Red Crag)
TM48NE9	0	1.8	Lowestoft Till
TM48NE9	1.8	6.5	Corton Beds

TM48NE9	6.5	9	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48NW1	0	0.3	Topsoil or Made Ground
TM48NW1	0.3	1.9	Lowestoft Till
TM48NW10	0	75.29	VOID
TM48NW10	75.29	92.96	Upper Chalk
TM48NW16	0	15.54	Crag (Norwich Crag and Red Crag)
TM48NW16	15.54	91.46	Upper Chalk
TM48NW17	0	4.27	Topsoil or Made Ground
TM48NW17	4.27	5.48	Lowestoft Till
TM48NW18	0	1.83	Lowestoft Till
TM48NW18	1.83	35.97	Crag (Norwich Crag and Red Crag)
TM48NW18	35.97	53.35	Upper Chalk
TM48NW19	0	0.3	Topsoil or Made Ground
TM48NW19	0.3	5.4	Lowestoft Till
TM48NW19	5.4	6.1	Corton Beds
TM48NW2	0	9.45	Lowestoft Till
TM48NW4	0	7.24	Corton Beds
TM48NW4	7.24	13.41	Norwich Brickearth (brickclay component Corton Formation)
TM48NW4	13.41	16.76	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48NW5	0	7.76	Lowestoft Till
TM48NW5	7.76	47	Crag (Norwich Crag and Red Crag)
TM48NW5	47	48.76	Upper Chalk
TM48NW6	0	20.12	Lowestoft Till
TM48NW6	20.12	46.33	Crag (Norwich Crag and Red Crag)
TM48NW6	46.33	61.57	Upper Chalk
TM48NW7	0	34.75	Crag (Norwich Crag and Red Crag)
TM48NW7	34.75	70.1	Upper Chalk
TM48NW8	0	16.46	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48NW8	16.46	57.91	Upper Chalk
TM48NW9	0	37.49	Crag (Norwich Crag and Red Crag)
TM48NW9	37.49	72.24	Upper Chalk
TM48SE3	0	9.14	Lowestoft Till
TM48SE3	9.14	16.46	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48SE3	16.46	17.98	Crag (Norwich Crag and Red Crag)
TM48SW17	0	14.63	Lowestoft Till
TM48SW17	14.63	19.2	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48SW17	19.2	41.45	Crag (Norwich Crag and Red Crag)
TM48SW17	41.45	91.44	Upper Chalk
TM48SW2	0	10.67	Lowestoft Till
TM48SW2	10.67	41.76	Crag (Norwich Crag and Red Crag)

TM48SW2	41.67	67.97	Upper Chalk
TM48SW21	0	0.61	Topsoil or Made Ground
TM48SW21	0.61	12.8	Lowestoft Till
TM48SW21	12.8	24.38	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48SW21	24.38	34.75	Crag (Norwich Crag and Red Crag)
TM48SW21	34.75	76.2	Upper Chalk
TM48SW22	0	13.72	Lowestoft Till
TM48SW22	13.72	18.29	Norwich Brickearth (brickclay component Corton Formation)
TM48SW22	18.29	25	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM48SW22	25	59.74	Crag (Norwich Crag and Red Crag)
TM48SW22	59.74	94.49	Upper Chalk
TM48SW4	0	0.61	Topsoil or Made Ground
TM48SW4	0.61	15.24	Lowestoft Till
TM48SW4	15.24	24.54	Crag (Norwich Crag and Red Crag)
TM49NE1	0	3.05	Upper Clay (Breydon Formation)
TM49NE1	3.05	7.32	Middle Peat (Breydon Formation)
TM49NE1	7.32	13.41	Lower Clay (Breydon Formation)
TM49NE1	13.41	16.76	Crag (Norwich Crag and Red Crag)
TM49NE12	0	10.97	Cover Sand
TM49NE14	0	4.57	Lowestoft Till
TM49NE14	4.57	13.72	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49NE17	0	11.89	Lowestoft Till
TM49NE17	11.89	14.33	Crag (Norwich Crag and Red Crag)
TM49NE18	0	7.62	Cover Sand
TM49NE18	7.62	8.84	Norwich Brickearth (brickclay component Corton Formation)
TM49NE18	8.84	23.47	Crag (Norwich Crag and Red Crag)
TM49NE19	0	0.8	Topsoil or Made Ground
TM49NE19	0.8	4.7	Upper Clay (Breydon Formation)
TM49NE19	4.7	6.8	Middle Peat (Breydon Formation)
TM49NE19	6.8	12.5	Lower Clay (Breydon Formation)
TM49NE19	12.5	23.8	Crag (Norwich Crag and Red Crag)
TM49NE20	0	0.2	Topsoil or Made Ground
TM49NE20	0.2	1.7	Upper Clay (Breydon Formation)
TM49NE20	1.7	6.9	Middle Peat (Breydon Formation)
TM49NE20	6.9	9.2	Lower Peat (Breydon Formation)
TM49NE20	9.2	15	Crag (Norwich Crag and Red Crag)
TM49NE21	0	0.3	Topsoil or Made Ground
TM49NE21	0.3	8	Lowestoft Till
TM49NE21	8	19.4	Crag (Norwich Crag and Red Crag)
TM49NE22	0	0.6	Topsoil or Made Ground

TM49NE22	0.6	24.7	Lowestoft Till
TM49NE22	24.7	26.1	Crag (Norwich Crag and Red Crag)
TM49NE24	0	0.5	Topsoil or Made Ground
TM49NE24	0.5	2.9	Lowestoft Till
TM49NE24	2.9	6.9	Lowestoft Till
TM49NE24	6.9	10.9	Corton Beds
TM49NE24	10.9	28.8	Crag (Norwich Crag and Red Crag)
TM49NE26	0	0.6	Topsoil or Made Ground
TM49NE26	0.6	13.2	Lowestoft Till
TM49NE26	13.2	23.2	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49NE26	23.2	25	Crag (Norwich Crag and Red Crag)
TM49NE27 -- UEA	0	3.3	Upper Clay (Breydon Formation)
TM49NE27 -- UEA	3.3	5.5	Middle Peat (Breydon Formation)
TM49NE27 -- UEA	5.5	6.5	Lower Clay (Breydon Formation)
TM49NE28 -- UEA	0	3.1	Upper Clay (Breydon Formation)
TM49NE28 -- UEA	3.1	5.4	Middle Peat (Breydon Formation)
TM49NE28 -- UEA	5.4	11.9	Lower Clay (Breydon Formation)
TM49NE28 -- UEA	11.9	12	Crag (Norwich Crag and Red Crag)
TM49NE29 -- UEA	0	3.6	Upper Clay (Breydon Formation)
TM49NE29 -- UEA	3.6	5.7	Middle Peat (Breydon Formation)
TM49NE29 -- UEA	5.7	11.7	Lower Clay (Breydon Formation)
TM49NE29 -- UEA	11.7	11.8	Lower Peat (Breydon Formation)
TM49NE30 -- UEA	0	2.2	Upper Clay (Breydon Formation)
TM49NE30 -- UEA	2.2	5.9	Middle Peat (Breydon Formation)
TM49NE30 -- UEA	5.9	11.6	Lower Clay (Breydon Formation)
TM49NE30 -- UEA	11.6	11.7	Lower Peat (Breydon Formation)
TM49NE31 -- UEA	0	3.3	Upper Clay (Breydon Formation)
TM49NE31 -- UEA	3.3	6.5	Middle Peat (Breydon Formation)
TM49NE31 -- UEA	6.5	10.7	Lower Clay (Breydon Formation)
TM49NE31 -- UEA	10.7	11	Lower Peat (Breydon Formation)
TM49NE32	0	3.3	Upper Clay (Breydon Formation)
TM49NE32	3.3	6.5	Middle Peat (Breydon Formation)
TM49NE32	6.5	10.7	Lower Clay (Breydon Formation)
TM49NE32	10.7	11	Crag (Norwich Crag and Red Crag)
TM49NE33	0	3.3	Upper Clay (Breydon Formation)
TM49NE33	3.3	6.6	Middle Peat (Breydon Formation)
TM49NE33	6.6	7.01	Lower Clay (Breydon Formation)
TM49NE34	0	4.6	Upper Clay (Breydon Formation)
TM49NE34	4.6	6.4	Middle Peat (Breydon Formation)
TM49NE34	6.4	6.6	Lower Clay (Breydon Formation)
TM49NE35	0	4.2	Upper Clay (Breydon Formation)
TM49NE35	4.2	6.4	Middle Peat (Breydon Formation)
TM49NE35	6.4	6.6	Lower Clay (Breydon Formation)
TM49NE36	0	3.4	Upper Clay (Breydon Formation)

TM49NE36	3.4	6.3	Middle Peat (Breydon Formation)
TM49NE36	6.3	6.5	Lower Clay (Breydon Formation)
TM49NE37	0	4.3	Upper Clay (Breydon Formation)
TM49NE37	4.3	6.5	Middle Peat (Breydon Formation)
TM49NE37	6.5	6.7	Lower Clay (Breydon Formation)
TM49NE38	0	2.3	Upper Clay (Breydon Formation)
TM49NE38	2.3	6.5	Middle Peat (Breydon Formation)
TM49NE38	6.5	7.3	Lower Clay (Breydon Formation)
TM49NE39	0	1.2	Upper Clay (Breydon Formation)
TM49NE39	1.2	6.4	Middle Peat (Breydon Formation)
TM49NE39	6.4	7	Lower Clay (Breydon Formation)
TM49NE39	7	7.1	Crag (Norwich Crag and Red Crag)
TM49NE4	0	5.67	Upper Clay (Breydon Formation)
TM49NE4	5.67	7.32	Middle Peat (Breydon Formation)
TM49NE4	7.32	17.68	Lower Clay (Breydon Formation)
TM49NE4	17.68	19.2	Lower Peat (Breydon Formation)
TM49NE4	19.2	20.8	Lowestoft Till
TM49NE40	0	1.25	Topsoil or Made Ground
TM49NE40	1.25	3.56	Upper Clay (Breydon Formation)
TM49NE40	3.56	5.52	Middle Peat (Breydon Formation)
TM49NE40	5.52	9.92	Lower Clay (Breydon Formation)
TM49NE40	9.92	10.28	Lower Peat (Breydon Formation)
TM49NE40	10.28	10.73	Crag (Norwich Crag and Red Crag)
TM49NE42	0	0.61	Topsoil or Made Ground
TM49NE42	0.61	9.45	Norwich Brickearth (brickclay component Corton Formation)
TM49NE42	9.45	28.96	Crag (Norwich Crag and Red Crag)
TM49NE44	0	4.27	Upper Clay (Breydon Formation)
TM49NE44	4.27	6.93	Middle Peat (Breydon Formation)
TM49NE45	0	0.46	Topsoil or Made Ground
TM49NE45	0.46	4.57	Upper Clay (Breydon Formation)
TM49NE46	0	0.46	Topsoil or Made Ground
TM49NE46	0.46	4.5	Upper Clay (Breydon Formation)
TM49NE48	0	13.72	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49NE48	13.72	40.23	Crag (Norwich Crag and Red Crag)
TM49NE52	0	0.3	Topsoil or Made Ground
TM49NE52	0.3	25.5	Crag (Norwich Crag and Red Crag)
TM49NE56	0	6.4	Upper Clay (Breydon Formation)
TM49NE56	6.4	8.8	Middle Peat (Breydon Formation)
TM49NE56	8.8	10.7	Lower Clay (Breydon Formation)
TM49NE57	0	11.5	Alluvium (Composite Breydon Formation)
TM49NE57	11.5	35	Crag (Norwich Crag and Red Crag)
TM49NE58	0	0.4	Topsoil or Made Ground

TM49NE58	0.4	1.4	Topsoil or Made Ground
TM49NE58	1.4	13	Alluvium (Composite Breydon Formation)
TM49NE58	13	29.5	Crag (Norwich Crag and Red Crag)
TM49NE59	0	0.4	Topsoil or Made Ground
TM49NE59	0.4	1.5	Topsoil or Made Ground
TM49NE59	1.5	10	Alluvium (Composite Breydon Formation)
TM49NE59	10	15	Crag (Norwich Crag and Red Crag)
TM49NE7	0	17.83	Lowestoft Till
TM49NE7	17.83	17.83	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49NE8	0	5.8	Upper Clay (Breydon Formation)
TM49NE8	5.8	7.3	Middle Peat (Breydon Formation)
TM49NE8	7.3	15.9	Lower Clay (Breydon Formation)
TM49NE8	15.9	16.61	Lower Peat (Breydon Formation)
TM49NE9	0	0.91	Topsoil or Made Ground
TM49NE9	0.91	3.96	Upper Clay (Breydon Formation)
TM49NE9	3.96	5.79	Middle Peat (Breydon Formation)
TM49NE9	5.79	15.54	Lower Clay (Breydon Formation)
TM49NE9	15.54	19.51	Lowestoft Till
TM49NE9	19.51	21.64	Crag (Norwich Crag and Red Crag)
TM49NW1	0	0.3	Topsoil or Made Ground
TM49NW1	0.3	3.1	Upper Clay (Breydon Formation)
TM49NW10	0	1.07	Topsoil or Made Ground
TM49NW10	1.07	1.68	Crag (Norwich Crag and Red Crag)
TM49NW11	0	3.05	Lowestoft Till
TM49NW11	3.05	27.43	Corton Beds
TM49NW11	27.43	76.2	Crag (Norwich Crag and Red Crag)
TM49NW11	76.2	99.36	Upper Chalk
TM49NW12	0	16.15	Lowestoft Till
TM49NW12	16.15	24.38	Crag (Norwich Crag and Red Crag)
TM49NW12	24.38	30.18	Crag (Norwich Crag and Red Crag)
TM49NW13	0	2.44	Upper Clay (Breydon Formation)
TM49NW13	2.44	3.35	Middle Peat (Breydon Formation)
TM49NW13	3.35	15.85	Lower Clay (Breydon Formation)
TM49NW13	15.85	19.81	Crag (Norwich Crag and Red Crag)
TM49NW14	0	27.13	Norwich Brickearth (brickclay component Corton Formation)
TM49NW14	27.13	52.73	Crag (Norwich Crag and Red Crag)
TM49NW14	52.73	67.06	Upper Chalk
TM49NW15	0	0.61	Topsoil or Made Ground
TM49NW15	0.61	10.67	Lowestoft Till
TM49NW15	10.67	13.72	Corton Beds
TM49NW15	13.72	53.34	Crag (Norwich Crag and Red Crag)

TM49NW15	53.34	106.68	Upper Chalk
TM49NW17	0	0.91	Topsoil or Made Ground
TM49NW17	0.91	7.92	Lowestoft Till
TM49NW17	7.92	24.69	Corton Beds
TM49NW17	24.69	60.96	Crag (Norwich Crag and Red Crag)
TM49NW17	60.96	66.14	Upper Chalk
TM49NW18	0	22.6	Crag (Norwich Crag and Red Crag)
TM49NW19	0	13.7	Lowestoft Till
TM49NW2	0	0.23	Topsoil or Made Ground
TM49NW2	0.23	1.37	Upper Clay (Breydon Formation)
TM49NW2	1.37	2.7	Crag (Norwich Crag and Red Crag)
TM49NW20	0	0.5	Topsoil or Made Ground
TM49NW20	0.5	1.2	Lowestoft Till
TM49NW20	1.2	8.9	Corton Beds
TM49NW20	8.9	10.4	Norwich Brickearth (brickclay component Corton Formation)
TM49NW20	10.4	18	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49NW20	18	23.4	Crag (Norwich Crag and Red Crag)
TM49NW22	0	0.4	Topsoil or Made Ground
TM49NW22	0.4	4	Lowestoft Till
TM49NW22	4	16.7	Corton Beds
TM49NW22	16.7	20.8	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49NW22	20.8	22	Crag (Norwich Crag and Red Crag)
TM49NW23	0	0.2	Topsoil or Made Ground
TM49NW23	0.2	1.1	Cover Sand
TM49NW23	1.1	7.35	Lowestoft Till
TM49NW23	7.35	16.5	Corton Beds
TM49NW23	16.5	17.8	Norwich Brickearth (brickclay component Corton Formation)
TM49NW23	17.8	22.3	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49NW23	22.3	31.3	Crag (Norwich Crag and Red Crag)
TM49NW25	0	0.5	Upper Peat (Breydon Formation)
TM49NW25	0.5	1	Upper Clay (Breydon Formation)
TM49NW25	1	3.8	Middle Peat (Breydon Formation)
TM49NW25	3.8	3.9	Crag (Norwich Crag and Red Crag)
TM49NW26	0	0.3	Upper Peat (Breydon Formation)
TM49NW26	0.3	1.1	Upper Clay (Breydon Formation)
TM49NW26	1.1	4.2	Middle Peat (Breydon Formation)
TM49NW26	4.2	4.3	Crag (Norwich Crag and Red Crag)
TM49NW27	0	3	Upper Clay (Breydon Formation)
TM49NW27	3	6.1	Middle Peat (Breydon Formation)
TM49NW27	6.1	6.7	Lower Clay (Breydon Formation)

TM49NW27	6.7	6.8	Crag (Norwich Crag and Red Crag)
TM49NW28	0	4.41	Upper Clay (Breydon Formation)
TM49NW28	4.41	6.2	Middle Peat (Breydon Formation)
TM49NW28	6.2	7.3	Lower Clay (Breydon Formation)
TM49NW28	7.3	7.5	Crag (Norwich Crag and Red Crag)
TM49NW29	0	4	Upper Clay (Breydon Formation)
TM49NW29	4	6.2	Middle Peat (Breydon Formation)
TM49NW29	6.2	7.3	Lower Clay (Breydon Formation)
TM49NW29	7.3	7.4	Crag (Norwich Crag and Red Crag)
TM49NW3	0	0.3	Topsoil or Made Ground
TM49NW3	0.3	0.7	Upper Peat (Breydon Formation)
TM49NW3	0.7	2.97	Middle Peat (Breydon Formation)
TM49NW30	0	5.3	Upper Clay (Breydon Formation)
TM49NW30	5.3	6.1	Middle Peat (Breydon Formation)
TM49NW30	6.1	8.2	Lower Clay (Breydon Formation)
TM49NW30	8.2	8.3	Crag (Norwich Crag and Red Crag)
TM49NW4	0	1.2	Topsoil or Made Ground
TM49NW4	1.2	4.3	Lowestoft Till
TM49NW4	4.3	7	Crag (Norwich Crag and Red Crag)
TM49NW44	0	0.91	Topsoil or Made Ground
TM49NW44	0.91	15.24	Lowestoft Till
TM49NW44	15.24	42.68	Corton Beds
TM49NW44	42.68	66.47	Crag (Norwich Crag and Red Crag)
TM49NW44	66.47	67.08	Upper Chalk
TM49NW5	0	0.3	Topsoil or Made Ground
TM49NW5	0.3	2.7	Upper Clay (Breydon Formation)
TM49NW53	0	0.8	Topsoil or Made Ground
TM49NW53	0.8	7.1	Crag (Norwich Crag and Red Crag)
TM49NW54	0	6.7	Crag (Norwich Crag and Red Crag)
TM49NW55	0	4.5	Crag (Norwich Crag and Red Crag)
TM49NW56	0	7.1	Crag (Norwich Crag and Red Crag)
TM49NW57	0	2.44	Upper Clay (Breydon Formation)
TM49NW57	2.44	6.1	Middle Peat (Breydon Formation)
TM49NW57	6.1	15.24	Lower Clay (Breydon Formation)
TM49NW57	15.24	15.84	Lower Peat (Breydon Formation)
TM49NW57	15.84	20.12	Crag (Norwich Crag and Red Crag)
TM49NW58	0	4.88	Upper Clay (Breydon Formation)
TM49NW58	4.88	6.71	Middle Peat (Breydon Formation)
TM49NW58	6.71	14.63	Lower Clay (Breydon Formation)
TM49NW58	14.63	19.81	Crag (Norwich Crag and Red Crag)
TM49NW6	0	0.3	Topsoil or Made Ground
TM49NW6	0.3	2.7	Lowestoft Till
TM49NW63	0	26.51	Crag (Norwich Crag and Red Crag)
TM49NW64	0	5.1	Upper Clay (Breydon Formation)

TM49NW64	5.1	7	Middle Peat (Breydon Formation)
TM49NW64	7	10.7	Lower Clay (Breydon Formation)
TM49NW7	0	0.6	Topsoil or Made Ground
TM49NW7	0.6	3.9	Middle Peat (Breydon Formation)
TM49NW7	3.9	4.3	Crag (Norwich Crag and Red Crag)
TM49NW8	0	0.46	Topsoil or Made Ground
TM49NW8	0.46	1.5	Middle Peat (Breydon Formation)
TM49NW9	0	0.46	Topsoil or Made Ground
TM49NW9	0.46	1.07	Upper Clay (Breydon Formation)
TM49NW9	1.07	1.98	Middle Peat (Breydon Formation)
TM49SE1	0	3.65	Lowestoft Till
TM49SE10	0	7.01	Lowestoft Till
TM49SE10	7.01	33.22	Lowestoft Till
TM49SE10	33.22	63.7	Crag (Norwich Crag and Red Crag)
TM49SE10	63.7	66.75	London Clay
TM49SE13	0	1.2	Topsoil or Made Ground
TM49SE13	1.2	22.5	Lowestoft Till
TM49SE13	22.5	24.8	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SE13	24.8	26	London Clay
TM49SE14	0	0.5	Topsoil or Made Ground
TM49SE14	0.5	26	Lowestoft Till
TM49SE15	0	0.7	Topsoil or Made Ground
TM49SE15	0.7	1.5	Lowestoft Till
TM49SE15	1.5	10.6	Corton Beds
TM49SE15	10.6	22.5	Crag (Norwich Crag and Red Crag)
TM49SE2	0	1.22	Topsoil or Made Ground
TM49SE2	1.22	12.5	Lowestoft Till
TM49SE2	12.5	62.18	Crag (Norwich Crag and Red Crag)
TM49SE2	62.18	110.64	London Clay
TM49SE2	110.64	120.7	Upper Chalk
TM49SE4	0	1.22	Topsoil or Made Ground
TM49SE4	1.22	3.66	Corton Beds
TM49SE4	3.66	6.1	Norwich Brickearth (brickclay component Corton Formation)
TM49SE4	6.1	61.24	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SE44	0	0.91	Topsoil or Made Ground
TM49SE44	0.91	9.75	Corton Beds
TM49SE44	9.75	22.25	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SE48	0	10.7	Alluvium (Composite Breydon Formation)
TM49SE6	0	14.63	Lowestoft Till
TM49SE6	14.63	20.73	Crag (Norwich Crag and Red Crag)

TM49SE7	0	7.92	Corton Beds
TM49SE7	7.92	11.89	Norwich Brickearth (brickclay component Corton Formation)
TM49SE7	11.89	19.2	Crag (Norwich Crag and Red Crag)
TM49SE8	0	0.3	Topsoil or Made Ground
TM49SE8	0.3	7.9	Lowestoft Till
TM49SE8	7.9	15.3	Corton Beds
TM49SE8	15.3	20	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SE8	20	30.1	Crag (Norwich Crag and Red Crag)
TM49SE9	0	0.4	Topsoil or Made Ground
TM49SE9	0.4	9.4	Corton Beds
TM49SE9	9.4	10.9	Norwich Brickearth (brickclay component Corton Formation)
TM49SE9	10.9	13.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SE9	13.4	22	Crag (Norwich Crag and Red Crag)
TM49SW1	0	0.3	Topsoil or Made Ground
TM49SW1	0.3	5.18	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW1	5.18	13.41	Crag (Norwich Crag and Red Crag)
TM49SW1	13.41	16.92	Upper Chalk
TM49SW10	0	0.15	Topsoil or Made Ground
TM49SW10	0.15	3.05	Middle Peat (Breydon Formation)
TM49SW10	3.05	5.03	Lowestoft Till
TM49SW100	0	0.4	Topsoil or Made Ground
TM49SW100	0.4	0.7	Middle Peat (Breydon Formation)
TM49SW100	0.7	3.8	Lower Clay (Breydon Formation)
TM49SW100	3.8	5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW100	5	8.1	Crag (Norwich Crag and Red Crag)
TM49SW100	8.1	10.1	London Clay
TM49SW101	0	0.4	Topsoil or Made Ground
TM49SW101	0.4	5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW101	5	6	Crag (Norwich Crag and Red Crag)
TM49SW102	0	0.3	Topsoil or Made Ground
TM49SW102	0.3	2	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW102	2	6	Crag (Norwich Crag and Red Crag)
TM49SW104	0	0.2	Topsoil or Made Ground
TM49SW104	0.2	3	Crag (Norwich Crag and Red Crag)
TM49SW105	0	0.5	Topsoil or Made Ground
TM49SW105	0.5	6.05	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW106	0	0.3	Topsoil or Made Ground

TM49SW106	0.3	5.9	Lowestoft Till
TM49SW107	0	1.6	Middle Peat (Breydon Formation)
TM49SW107	1.6	6.15	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW108	0	0.4	Topsoil or Made Ground
TM49SW108	0.4	5.1	Corton Beds
TM49SW108	5.1	6.2	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW109	0	0.5	Topsoil or Made Ground
TM49SW109	0.5	6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW110	0	0.5	Topsoil or Made Ground
TM49SW110	0.5	1.3	Middle Peat (Breydon Formation)
TM49SW110	1.3	6	Crag (Norwich Crag and Red Crag)
TM49SW111	0	2.5	Middle Peat (Breydon Formation)
TM49SW111	2.5	3.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW111	3.5	6.1	Crag (Norwich Crag and Red Crag)
TM49SW112	0	0.6	Topsoil or Made Ground
TM49SW112	0.6	6	Crag (Norwich Crag and Red Crag)
TM49SW113	0	0.5	Topsoil or Made Ground
TM49SW113	0.5	4.4	Corton Beds
TM49SW113	4.4	8	Crag (Norwich Crag and Red Crag)
TM49SW114	0	1.35	Topsoil or Made Ground
TM49SW114	1.35	7	Crag (Norwich Crag and Red Crag)
TM49SW115	0	0.2	Topsoil or Made Ground
TM49SW115	0.2	5.5	Crag (Norwich Crag and Red Crag)
TM49SW116	0	0.3	Topsoil or Made Ground
TM49SW116	0.3	9	Crag (Norwich Crag and Red Crag)
TM49SW117	0	0.1	Topsoil or Made Ground
TM49SW117	0.1	10	Crag (Norwich Crag and Red Crag)
TM49SW118	0	0.5	Topsoil or Made Ground
TM49SW118	0.5	10	Crag (Norwich Crag and Red Crag)
TM49SW119	0	0.7	Topsoil or Made Ground
TM49SW119	0.7	10	Crag (Norwich Crag and Red Crag)
TM49SW12	0	1.98	Topsoil or Made Ground
TM49SW12	1.98	3.35	Upper Clay (Breydon Formation)
TM49SW12	3.35	7.31	Middle Peat (Breydon Formation)
TM49SW12	7.31	20.42	Lowestoft Till
TM49SW120	0	0.4	Topsoil or Made Ground
TM49SW120	0.4	6.6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW120	6.6	8	Crag (Norwich Crag and Red Crag)
TM49SW121	0	0.4	Topsoil or Made Ground
TM49SW121	0.4	4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)

TM49SW122	0	0.8	Topsoil or Made Ground
TM49SW122	0.8	7.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW122	7.1	9.1	Crag (Norwich Crag and Red Crag)
TM49SW123	0	0.65	Topsoil or Made Ground
TM49SW123	0.65	5.1	Crag (Norwich Crag and Red Crag)
TM49SW124	0	0.5	Topsoil or Made Ground
TM49SW124	0.5	8	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW125	0	0.8	Topsoil or Made Ground
TM49SW125	0.8	7.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW126	0	0.35	Topsoil or Made Ground
TM49SW126	0.35	4.8	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW126	4.8	6	Crag (Norwich Crag and Red Crag)
TM49SW13	0	2.44	Topsoil or Made Ground
TM49SW13	2.44	5.03	Crag (Norwich Crag and Red Crag)
TM49SW132	0	0.8	Topsoil or Made Ground
TM49SW132	0.8	6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW133	0	0.2	Topsoil or Made Ground
TM49SW133	0.2	6.1	Lowestoft Till
TM49SW133	6.1	14.1	Corton Beds
TM49SW133	14.1	20.8	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW133	20.8	24.7	Crag (Norwich Crag and Red Crag)
TM49SW134	0	0.4	Topsoil or Made Ground
TM49SW134	0.4	2.7	Lowestoft Till
TM49SW134	2.7	12.6	Corton Beds
TM49SW134	12.6	19.8	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW134	19.8	24.5	Crag (Norwich Crag and Red Crag)
TM49SW135	0	0.3	Topsoil or Made Ground
TM49SW135	0.3	6.8	Lowestoft Till
TM49SW135	6.8	12.5	Corton Beds
TM49SW135	12.5	15.8	Crag (Norwich Crag and Red Crag)
TM49SW135	15.8	20.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW136	0	0.4	Topsoil or Made Ground
TM49SW136	0.4	2.7	Lowestoft Till
TM49SW136	2.7	4.7	Lowestoft Till
TM49SW136	4.7	10.6	Corton Beds
TM49SW136	10.6	19.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW136	19.4	26	Crag (Norwich Crag and Red Crag)

TM49SW137	0	2.4	Topsoil or Made Ground
TM49SW137	2.4	5	Lowestoft Till
TM49SW137	5	16.4	Corton Beds
TM49SW137	16.4	16.5	Norwich Brickearth (brickclay component Corton Formation)
TM49SW137	16.5	19.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW137	19.5	27.2	Crag (Norwich Crag and Red Crag)
TM49SW138	0	0.2	Topsoil or Made Ground
TM49SW138	0.2	8.5	Lowestoft Till
TM49SW138	8.5	23.6	Crag (Norwich Crag and Red Crag)
TM49SW139	0	2.1	Middle Peat (Breydon Formation)
TM49SW139	2.1	11	Crag (Norwich Crag and Red Crag)
TM49SW14	0	0.4	Topsoil or Made Ground
TM49SW14	0.4	2.1	Lowestoft Till
TM49SW140	0	2	Middle Peat (Breydon Formation)
TM49SW140	2	11	Crag (Norwich Crag and Red Crag)
TM49SW141	0	2.2	Middle Peat (Breydon Formation)
TM49SW141	2.2	11	Crag (Norwich Crag and Red Crag)
TM49SW142	0	4.4	Middle Peat (Breydon Formation)
TM49SW142	4.4	12	Crag (Norwich Crag and Red Crag)
TM49SW143	0	2.8	Middle Peat (Breydon Formation)
TM49SW143	2.8	15	Crag (Norwich Crag and Red Crag)
TM49SW144	0	2.3	Middle Peat (Breydon Formation)
TM49SW144	2.3	11	Crag (Norwich Crag and Red Crag)
TM49SW145	0	2.6	Middle Peat (Breydon Formation)
TM49SW145	2.6	6.8	Crag (Norwich Crag and Red Crag)
TM49SW145	6.8	7	London Clay
TM49SW146	0	1.2	Middle Peat (Breydon Formation)
TM49SW146	1.2	4.4	Crag (Norwich Crag and Red Crag)
TM49SW147	0	1.1	Middle Peat (Breydon Formation)
TM49SW147	1.1	10.9	Crag (Norwich Crag and Red Crag)
TM49SW148	0	0.65	Middle Peat (Breydon Formation)
TM49SW148	0.65	4.2	Crag (Norwich Crag and Red Crag)
TM49SW148	4.2	6	London Clay
TM49SW149	0	1.8	Middle Peat (Breydon Formation)
TM49SW149	1.8	7.5	Crag (Norwich Crag and Red Crag)
TM49SW15	0	0.5	Topsoil or Made Ground
TM49SW15	0.5	2.4	Lowestoft Till
TM49SW150	0	2	Middle Peat (Breydon Formation)
TM49SW150	2	10	Crag (Norwich Crag and Red Crag)
TM49SW151	0	1.7	Topsoil or Made Ground
TM49SW151	1.7	12	Crag (Norwich Crag and Red Crag)
TM49SW16	0	0.76	Topsoil or Made Ground
TM49SW16	0.76	0.91	Upper Peat (Breydon Formation)

TM49SW16	0.91	7.92	Corton Beds
TM49SW16	7.92	10	Crag (Norwich Crag and Red Crag)
TM49SW17	0	0.2	Topsoil or Made Ground
TM49SW17	0.2	0.9	Upper Clay (Breydon Formation)
TM49SW17	0.9	2.4	Middle Peat (Breydon Formation)
TM49SW17	2.4	3	Crag (Norwich Crag and Red Crag)
TM49SW178	0	7.32	Lowestoft Till
TM49SW178	7.32	14.94	Norwich Brickearth (brickclay component Corton Formation)
TM49SW178	14.94	26.82	Crag (Norwich Crag and Red Crag)
TM49SW178	26.82	54.86	Upper Chalk
TM49SW18	0	0.2	Topsoil or Made Ground
TM49SW18	0.2	0.6	Upper Clay (Breydon Formation)
TM49SW18	0.6	3	Lowestoft Till
TM49SW180	0	0.68	Topsoil or Made Ground
TM49SW180	0.68	4.88	Crag (Norwich Crag and Red Crag)
TM49SW181	0	0.68	Topsoil or Made Ground
TM49SW181	0.68	5.49	Crag (Norwich Crag and Red Crag)
TM49SW182	0	0.68	Topsoil or Made Ground
TM49SW182	0.68	5.49	Crag (Norwich Crag and Red Crag)
TM49SW183	0	0.68	Topsoil or Made Ground
TM49SW183	0.68	4.57	Crag (Norwich Crag and Red Crag)
TM49SW184	0	0.68	Topsoil or Made Ground
TM49SW184	0.68	6.09	Crag (Norwich Crag and Red Crag)
TM49SW185	0	0.68	Topsoil or Made Ground
TM49SW185	0.68	5.79	Crag (Norwich Crag and Red Crag)
TM49SW186	0	0.68	Topsoil or Made Ground
TM49SW186	0.68	5.48	Crag (Norwich Crag and Red Crag)
TM49SW187	0	0.68	Topsoil or Made Ground
TM49SW187	0.68	5.18	Crag (Norwich Crag and Red Crag)
TM49SW188	0	0.68	Topsoil or Made Ground
TM49SW188	0.68	2.13	Upper Clay (Breydon Formation)
TM49SW188	2.13	5.18	Crag (Norwich Crag and Red Crag)
TM49SW189	0	0.68	Topsoil or Made Ground
TM49SW189	0.68	5.79	Crag (Norwich Crag and Red Crag)
TM49SW19	0	0.4	Topsoil or Made Ground
TM49SW19	0.4	0.5	Middle Peat (Breydon Formation)
TM49SW19	0.5	2.4	Crag (Norwich Crag and Red Crag)
TM49SW190	0	0.68	Topsoil or Made Ground
TM49SW190	0.68	1.24	Upper Clay (Breydon Formation)
TM49SW190	1.24	3.04	Upper Chalk
TM49SW191	0	0.68	Topsoil or Made Ground
TM49SW191	0.68	6.09	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW192	0	0.34	Topsoil or Made Ground

TM49SW192	0.34	5.48	Crag (Norwich Crag and Red Crag)
TM49SW2	0	0.6	Middle Peat (Breydon Formation)
TM49SW2	0.6	1.5	Lowestoft Till
TM49SW20	0	1.5	Middle Peat (Breydon Formation)
TM49SW20	1.5	3	Lowestoft Till
TM49SW205	0	0.7	Topsoil or Made Ground
TM49SW205	0.7	6	Lowestoft Till
TM49SW206	0	0.55	Topsoil or Made Ground
TM49SW206	0.55	6.1	Lowestoft Till
TM49SW206	6.1	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW207	0	0.55	Topsoil or Made Ground
TM49SW207	0.55	6	Lowestoft Till
TM49SW208	0	0.55	Topsoil or Made Ground
TM49SW208	0.55	6	Lowestoft Till
TM49SW21	0	0.8	Topsoil or Made Ground
TM49SW21	0.8	2.6	Crag (Norwich Crag and Red Crag)
TM49SW22	0	0.4	Topsoil or Made Ground
TM49SW22	0.4	3.8	Lowestoft Till
TM49SW23	0	0.6	Topsoil or Made Ground
TM49SW23	0.6	3.8	Crag (Norwich Crag and Red Crag)
TM49SW24	0	0.91	Lowestoft Till
TM49SW24	0.91	4.57	Corton Beds
TM49SW24	4.57	5.94	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW25	0	4.88	Lowestoft Till
TM49SW25	4.88	5.94	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW26	0	1.22	Upper Clay (Breydon Formation)
TM49SW26	1.22	6.71	Middle Peat (Breydon Formation)
TM49SW26	6.71	10.21	Lowestoft Till
TM49SW26	10.21	18.9	Crag (Norwich Crag and Red Crag)
TM49SW26	18.9	106.68	Upper Chalk
TM49SW27	0	1.52	Topsoil or Made Ground
TM49SW27	1.52	4.57	Middle Peat (Breydon Formation)
TM49SW27	4.57	10.97	Lowestoft Till
TM49SW27	10.97	17.37	Crag (Norwich Crag and Red Crag)
TM49SW27	17.37	57.91	Upper Chalk
TM49SW28	0	0.3	Topsoil or Made Ground
TM49SW28	0.3	7.62	Lowestoft Till
TM49SW28	7.62	20.12	Corton Beds
TM49SW28	20.12	60.96	Upper Chalk
TM49SW29	0	0.76	Topsoil or Made Ground
TM49SW29	0.76	2.44	Upper Clay (Breydon Formation)
TM49SW29	2.44	6.25	Middle Peat (Breydon Formation)

TM49SW29	6.25	8.48	Lowestoft Till
TM49SW29	8.48	8.59	Crag (Norwich Crag and Red Crag)
TM49SW3	0	0.4	Lowestoft Till
TM49SW3	0.4	1.3	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW30	0	7.01	Lowestoft Till
TM49SW30	7.01	25.6	Crag (Norwich Crag and Red Crag)
TM49SW30	25.6	45.72	Upper Chalk
TM49SW31	0	17.68	Crag (Norwich Crag and Red Crag)
TM49SW31	17.68	25.6	Upper Chalk
TM49SW32	0	17.68	Lowestoft Till
TM49SW32	17.68	18.59	Norwich Brickearth (brickclay component Corton Formation)
TM49SW32	18.59	21.94	Crag (Norwich Crag and Red Crag)
TM49SW33	0	5.79	Lowestoft Till
TM49SW33	5.79	7.62	London Clay
TM49SW34	0	1.37	Lowestoft Till
TM49SW34	1.37	4.11	Crag (Norwich Crag and Red Crag)
TM49SW35	0	25.6	Lowestoft Till
TM49SW35	25.6	36.58	Upper Chalk
TM49SW36	0	1.52	Topsoil or Made Ground
TM49SW36	1.52	55.17	Lowestoft Till
TM49SW36	55.17	97.84	Upper Chalk
TM49SW37	0	0.9	Topsoil or Made Ground
TM49SW37	0.9	32.61	Lowestoft Till
TM49SW37	32.61	76.2	Upper Chalk
TM49SW38	0	25.3	Lowestoft Till
TM49SW38	25.3	40.84	Lowestoft Till
TM49SW38	40.84	70.25	Crag (Norwich Crag and Red Crag)
TM49SW38	70.25	79.25	London Clay
TM49SW38	79.25	100.58	Upper Chalk
TM49SW39	0	0.53	Topsoil or Made Ground
TM49SW39	0.53	3.35	Lowestoft Till
TM49SW39	3.35	11.58	Corton Beds
TM49SW39	11.58	20.12	Crag (Norwich Crag and Red Crag)
TM49SW40	0	23.77	Lowestoft Till
TM49SW40	23.77	49.38	Crag (Norwich Crag and Red Crag)
TM49SW40	49.38	79.25	Upper Chalk
TM49SW41	0	24.38	Corton Beds
TM49SW41	24.38	60.96	Crag (Norwich Crag and Red Crag)
TM49SW41	60.96	91.44	London Clay
TM49SW41	91.44	106.68	Upper Chalk
TM49SW42	0	24.28	Corton Beds
TM49SW42	24.38	60.96	Crag (Norwich Crag and Red Crag)
TM49SW42	60.96	91.44	London Clay

TM49SW42	91.44	106.68	Upper Chalk
TM49SW43	0	17.37	Lowestoft Till
TM49SW43	17.37	60.96	Crag (Norwich Crag and Red Crag)
TM49SW43	60.96	72.54	Upper Chalk
TM49SW44	0	11.58	Lowestoft Till
TM49SW44	11.58	48.16	Crag (Norwich Crag and Red Crag)
TM49SW44	48.16	58.83	Upper Chalk
TM49SW45	0	27.13	Lowestoft Till
TM49SW45	27.13	44.81	Crag (Norwich Crag and Red Crag)
TM49SW46	0	19.81	Corton Beds
TM49SW46	19.81	27.24	Crag (Norwich Crag and Red Crag)
TM49SW46	27.74	28.96	London Clay
TM49SW50	0	0.3	Topsoil or Made Ground
TM49SW50	0.3	10	Lowestoft Till
TM49SW51	0	0.2	Topsoil or Made Ground
TM49SW51	0.2	10	Lowestoft Till
TM49SW52	0	0.2	Topsoil or Made Ground
TM49SW52	0.2	10	Lowestoft Till
TM49SW53	0	0.2	Topsoil or Made Ground
TM49SW53	0.2	6	Upper Clay (Breydon Formation)
TM49SW53	6	9.5	Lowestoft Till
TM49SW54	0	0.3	Topsoil or Made Ground
TM49SW54	0.3	8	Upper Clay (Breydon Formation)
TM49SW55	0	0.3	Topsoil or Made Ground
TM49SW55	0.3	6.2	Upper Clay (Breydon Formation)
TM49SW55	6.2	8.7	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW56	0	0.4	Topsoil or Made Ground
TM49SW56	0.4	3.9	Lowestoft Till
TM49SW56	3.9	7	Crag (Norwich Crag and Red Crag)
TM49SW57	0	0.6	Upper Peat (Breydon Formation)
TM49SW57	0.6	7	Lowestoft Till
TM49SW58	0	0.8	Upper Peat (Breydon Formation)
TM49SW58	0.8	5.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW58	5.5	7.5	Crag (Norwich Crag and Red Crag)
TM49SW59	0	0.9	Upper Peat (Breydon Formation)
TM49SW59	0.9	5.2	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW59	5.2	7.5	Crag (Norwich Crag and Red Crag)
TM49SW6	0	1.4	Middle Peat (Breydon Formation)
TM49SW6	1.4	1.6	Lowestoft Till
TM49SW60	0	1.2	Middle Peat (Breydon Formation)
TM49SW60	1.2	5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)

TM49SW60	5	7.05	Crag (Norwich Crag and Red Crag)
TM49SW61	0	1.5	Middle Peat (Breydon Formation)
TM49SW61	1.5	5.9	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW61	5.9	6.5	Crag (Norwich Crag and Red Crag)
TM49SW62	0	2.5	Middle Peat (Breydon Formation)
TM49SW62	2.5	6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW62	6	9.15	Crag (Norwich Crag and Red Crag)
TM49SW63	0	2.5	Middle Peat (Breydon Formation)
TM49SW63	2.5	4.8	Lowestoft Till
TM49SW63	4.8	9.15	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW64	0	2.5	Middle Peat (Breydon Formation)
TM49SW64	2.5	9	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW65	0	3.4	Middle Peat (Breydon Formation)
TM49SW65	3.4	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW66	0	4.2	Middle Peat (Breydon Formation)
TM49SW66	4.2	5.75	Lowestoft Till
TM49SW66	5.75	8	Corton Beds
TM49SW66	8	13	Crag (Norwich Crag and Red Crag)
TM49SW67	0	3.7	Middle Peat (Breydon Formation)
TM49SW67	3.7	11.1	Lowestoft Till
TM49SW67	11.1	16.1	Crag (Norwich Crag and Red Crag)
TM49SW68	0	4.1	Middle Peat (Breydon Formation)
TM49SW68	1	25.3	Upper Chalk
TM49SW68	4.1	5	Lower Clay (Breydon Formation)
TM49SW68	5	6	Corton Beds
TM49SW68	6	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW68	10	17	Crag (Norwich Crag and Red Crag)
TM49SW69	0	0.4	Upper Peat (Breydon Formation)
TM49SW69	0.4	1.6	Upper Clay (Breydon Formation)
TM49SW69	1.6	3.7	Middle Peat (Breydon Formation)
TM49SW69	3.7	4.7	Lower Clay (Breydon Formation)
TM49SW69	4.7	17	Crag (Norwich Crag and Red Crag)
TM49SW69	17	25	Upper Chalk
TM49SW7	0	0.5	Middle Peat (Breydon Formation)
TM49SW7	0.5	1.3	Crag (Norwich Crag and Red Crag)
TM49SW70	0	0.5	Upper Clay (Breydon Formation)
TM49SW70	0.5	4.1	Middle Peat (Breydon Formation)
TM49SW70	4.1	7	Corton Beds
TM49SW70	7	9.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)

TM49SW70	9.5	10	Crag (Norwich Crag and Red Crag)
TM49SW71	0	4.7	Middle Peat (Breydon Formation)
TM49SW71	4.7	6.5	Corton Beds
TM49SW71	6.5	10	Corton Beds
TM49SW71	10	19	London Clay
TM49SW71	19	20	Upper Chalk
TM49SW72	0	1.7	Topsoil or Made Ground
TM49SW72	1.7	2	Upper Peat (Breydon Formation)
TM49SW72	2	4.6	Upper Clay (Breydon Formation)
TM49SW72	4.6	7.6	Middle Peat (Breydon Formation)
TM49SW72	7.6	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW72	10	11.6	Crag (Norwich Crag and Red Crag)
TM49SW72	11.6	18.7	London Clay
TM49SW72	18.7	20	Upper Chalk
TM49SW73	0	1.9	Topsoil or Made Ground
TM49SW73	1.9	3.6	Upper Peat (Breydon Formation)
TM49SW73	3.6	5.9	Upper Clay (Breydon Formation)
TM49SW73	5.9	8.1	Middle Peat (Breydon Formation)
TM49SW73	8.1	11.9	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW73	11.9	13	Crag (Norwich Crag and Red Crag)
TM49SW73	13	19	London Clay
TM49SW73	19	25	Upper Chalk
TM49SW74	0	2.9	Topsoil or Made Ground
TM49SW74	2.9	6.6	Upper Peat (Breydon Formation)
TM49SW74	6.6	10.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW74	10.5	18.7	Crag (Norwich Crag and Red Crag)
TM49SW74	18.7	25	Upper Chalk
TM49SW75	0	3	Topsoil or Made Ground
TM49SW75	3	6.4	Middle Peat (Breydon Formation)
TM49SW75	6.4	11	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW75	11	15	London Clay
TM49SW76	0	2.8	Topsoil or Made Ground
TM49SW76	2.8	3	Upper Clay (Breydon Formation)
TM49SW76	3	6.7	Middle Peat (Breydon Formation)
TM49SW76	6.7	8.9	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW77	0	2.6	Topsoil or Made Ground
TM49SW77	2.6	6.7	Middle Peat (Breydon Formation)
TM49SW77	6.7	7.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW78	0	2.6	Topsoil or Made Ground
TM49SW78	2.6	2.9	Upper Clay (Breydon Formation)

TM49SW78	2.9	5.8	Middle Peat (Breydon Formation)
TM49SW78	5.8	6.45	Crag (Norwich Crag and Red Crag)
TM49SW79	0	1.7	Topsoil or Made Ground
TM49SW79	1.7	3.1	Middle Peat (Breydon Formation)
TM49SW79	3.1	3.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW8	0	0.5	Topsoil or Made Ground
TM49SW8	0.5	1.6	Lowestoft Till
TM49SW80	0	3.6	Topsoil or Made Ground
TM49SW80	3.6	4.6	Middle Peat (Breydon Formation)
TM49SW80	4.6	5.15	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW81	0	2.1	Topsoil or Made Ground
TM49SW81	2.1	2.5	Middle Peat (Breydon Formation)
TM49SW81	2.5	3.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW82	0	0.2	Topsoil or Made Ground
TM49SW82	0.2	5.6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW82	5.6	6.1	Crag (Norwich Crag and Red Crag)
TM49SW83	0	0.35	Topsoil or Made Ground
TM49SW83	0.35	3.7	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW83	3.7	6.25	Crag (Norwich Crag and Red Crag)
TM49SW84	0	0.25	Topsoil or Made Ground
TM49SW84	0.25	6.25	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW85	0	0.8	Topsoil or Made Ground
TM49SW85	0.8	6.2	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW85	6.2	8.05	Upper Chalk
TM49SW86	0	2	Lowestoft Till
TM49SW86	2	5.9	Corton Beds
TM49SW86	5.9	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW87	0	0.4	Topsoil or Made Ground
TM49SW87	0.4	1.05	Middle Peat (Breydon Formation)
TM49SW87	1.05	15	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW88	0	0.25	Topsoil or Made Ground
TM49SW88	0.25	0.95	Middle Peat (Breydon Formation)
TM49SW88	0.95	4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW88	4	10.1	Crag (Norwich Crag and Red Crag)
TM49SW89	0	1.2	Middle Peat (Breydon Formation)
TM49SW89	1.2	6.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)

TM49SW9	0	0.75	Topsoil or Made Ground
TM49SW9	0.75	1.4	Lowestoft Till
TM49SW9	1.4	1.5	Crag (Norwich Crag and Red Crag)
TM49SW90	0	0.4	Upper Clay (Breydon Formation)
TM49SW90	0.4	1.6	Middle Peat (Breydon Formation)
TM49SW90	1.6	6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW91	0	6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW92	0	0.4	Topsoil or Made Ground
TM49SW92	0.4	6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW93	0	0.5	Topsoil or Made Ground
TM49SW93	0.5	4.05	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW93	4.05	6.05	Crag (Norwich Crag and Red Crag)
TM49SW94	0	0.5	Topsoil or Made Ground
TM49SW94	0.5	3.5	Lowestoft Till
TM49SW94	3.5	4.3	Corton Beds
TM49SW94	4.3	6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW95	0	1.2	Topsoil or Made Ground
TM49SW95	1.2	5.6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM49SW95	5.6	6.05	London Clay
TM49SW96	0	0.5	Topsoil or Made Ground
TM49SW96	0.5	1.2	Upper Peat (Breydon Formation)
TM49SW96	1.2	23.7	Crag (Norwich Crag and Red Crag)
TM49SW97	0	0.8	Upper Peat (Breydon Formation)
TM49SW97	0.8	15	Crag (Norwich Crag and Red Crag)
TM49SW98	0	0.8	Upper Peat (Breydon Formation)
TM49SW98	0.8	14.5	Crag (Norwich Crag and Red Crag)
TM49SW99	0	0.3	Topsoil or Made Ground
TM49SW99	0.3	0.9	Upper Peat (Breydon Formation)
TM49SW99	0.9	10	Crag (Norwich Crag and Red Crag)
TM50SW41	0	0.5	Topsoil or Made Ground
TM50SW41	0.5	20	Corton Beds
TM58NW111	0	6.4	Topsoil or Made Ground
TM58NW111	6.4	15	Corton Beds
TM58NW112	0	3.4	Upper Clay (Breydon Formation)
TM58NW112	3.4	15	Crag (Norwich Crag and Red Crag)
TM58NW113	0	0.4	Topsoil or Made Ground
TM58NW113	0.4	1.4	Upper Clay (Breydon Formation)
TM58NW113	1.4	2.4	Lowestoft Till
TM58NW113	2.4	11.5	Corton Beds
TM59NE1	0	2.44	Corton Beds

TM59NE1	2.44	6.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW1	0	0.3	Topsoil or Made Ground
TM59NW1	0.3	6.1	Lowestoft Till
TM59NW11	0	6.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW112	0	0.91	Corton Beds
TM59NW112	0.91	8.99	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW113	0	8.99	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW114	0	1.52	Corton Beds
TM59NW114	1.52	8.99	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW115	0	7.01	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW116	0	1.22	Corton Beds
TM59NW116	1.22	5.79	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW116	5.79	7	Crag (Norwich Crag and Red Crag)
TM59NW117	0	7	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW119	0	0.5	Topsoil or Made Ground
TM59NW119	0.5	1.6	Corton Beds
TM59NW119	1.6	2.9	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW119	2.9	3.8	London Clay
TM59NW12	0	2.13	Corton Beds
TM59NW12	2.13	2.43	Crag (Norwich Crag and Red Crag)
TM59NW120	0	0.4	Topsoil or Made Ground
TM59NW120	0.4	2	Corton Beds
TM59NW120	2	3.2	London Clay
TM59NW121	0	0.6	Topsoil or Made Ground
TM59NW121	0.6	3.2	Corton Beds
TM59NW121	3.2	3.45	London Clay
TM59NW123	0	0.3	Topsoil or Made Ground
TM59NW123	0.3	3	Corton Beds
TM59NW123	3	3.2	London Clay
TM59NW125	0	0.3	Topsoil or Made Ground
TM59NW125	0.3	4.2	Corton Beds
TM59NW125	4.2	18.2	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW125	18.2	19.5	Crag (Norwich Crag and Red Crag)
TM59NW13	0	3.65	Lowestoft Till
TM59NW133	0	0.3	Topsoil or Made Ground
TM59NW133	0.3	5	Corton Beds

TM59NW133	5	12.6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW133	12.6	15	Crag (Norwich Crag and Red Crag)
TM59NW134	0	0.4	Topsoil or Made Ground
TM59NW134	0.4	10	Lowestoft Till
TM59NW135	0	0.25	Topsoil or Made Ground
TM59NW135	0.25	9.75	Lowestoft Till
TM59NW135	9.75	15	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW136	0	0.5	Topsoil or Made Ground
TM59NW136	0.5	10.15	Lowestoft Till
TM59NW137	0	0.3	Topsoil or Made Ground
TM59NW137	0.3	13.4	Lowestoft Till
TM59NW137	13.4	13.4	Crag (Norwich Crag and Red Crag)
TM59NW138	0	0.4	Topsoil or Made Ground
TM59NW138	0.4	6.3	Lowestoft Till
TM59NW138	6.3	7.6	Corton Beds
TM59NW138	7.6	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW139	0	0.45	Topsoil or Made Ground
TM59NW139	0.45	19.2	Lowestoft Till
TM59NW139	19.2	19.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW14	0	1.37	Corton Beds
TM59NW14	1.37	2.44	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW140	0	0.3	Topsoil or Made Ground
TM59NW140	0.3	10.25	Lowestoft Till
TM59NW141	0	0.2	Topsoil or Made Ground
TM59NW141	0.2	3.2	Lowestoft Till
TM59NW142	0	0.25	Topsoil or Made Ground
TM59NW142	0.25	3.4	Lowestoft Till
TM59NW143	0	0.3	Topsoil or Made Ground
TM59NW143	0.3	3.5	Lowestoft Till
TM59NW144	0	0.2	Topsoil or Made Ground
TM59NW144	0.2	1.7	Lowestoft Till
TM59NW144	1.7	3.2	London Clay
TM59NW145	0	0.2	Topsoil or Made Ground
TM59NW145	0.2	1.7	Lowestoft Till
TM59NW145	1.7	3.1	London Clay
TM59NW146	0	0.4	Topsoil or Made Ground
TM59NW146	0.4	3.4	Lowestoft Till
TM59NW147	0	0.3	Topsoil or Made Ground
TM59NW147	0.3	2.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW147	2.4	3.2	London Clay

TM59NW148	0	0.3	Topsoil or Made Ground
TM59NW148	0.3	1.5	Lowestoft Till
TM59NW148	1.5	3.2	London Clay
TM59NW149	0	0.3	Topsoil or Made Ground
TM59NW149	0.3	3.5	Lowestoft Till
TM59NW15	0	1.83	Lowestoft Till
TM59NW15	1.83	1.98	Corton Beds
TM59NW15	1.98	2.59	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW150	0	0.25	Topsoil or Made Ground
TM59NW150	0.25	3.3	Lowestoft Till
TM59NW151	0	0.3	Topsoil or Made Ground
TM59NW151	0.3	2.1	Lowestoft Till
TM59NW151	2.1	3.6	Crag (Norwich Crag and Red Crag)
TM59NW152	0	0.25	Topsoil or Made Ground
TM59NW152	0.25	3.3	Lowestoft Till
TM59NW153	0	0.25	Topsoil or Made Ground
TM59NW153	0.25	1.6	Lowestoft Till
TM59NW153	1.6	3.3	London Clay
TM59NW154	0	0.2	Topsoil or Made Ground
TM59NW154	0.2	2.6	Lowestoft Till
TM59NW154	2.6	3.1	London Clay
TM59NW155	0	0.3	Topsoil or Made Ground
TM59NW155	0.3	3.5	Lowestoft Till
TM59NW156	0	0.2	Topsoil or Made Ground
TM59NW156	0.2	3.5	Lowestoft Till
TM59NW157	0	0.25	Topsoil or Made Ground
TM59NW157	0.25	2.3	Lowestoft Till
TM59NW157	2.3	4.2	Corton Beds
TM59NW158	0	0.1	Topsoil or Made Ground
TM59NW158	0.1	3.2	Lowestoft Till
TM59NW158	3.2	3.8	London Clay
TM59NW159	0	0.2	Topsoil or Made Ground
TM59NW159	0.2	3.6	Lowestoft Till
TM59NW159	3.6	3.9	London Clay
TM59NW16	0	2.13	Lowestoft Till
TM59NW16	2.13	3.51	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW160	0	0.25	Topsoil or Made Ground
TM59NW160	0.25	3	Lowestoft Till
TM59NW161	0	0.25	Topsoil or Made Ground
TM59NW161	0.25	2.8	Lowestoft Till
TM59NW162	0	0.2	Topsoil or Made Ground
TM59NW162	0.2	3	Lowestoft Till
TM59NW163	0	0.2	Topsoil or Made Ground

TM59NW163	0.2	3.2	Lowestoft Till
TM59NW164	0	0.65	Topsoil or Made Ground
TM59NW164	0.65	8.4	Lowestoft Till
TM59NW164	8.4	10	Corton Beds
TM59NW165	0	11.5	Corton Beds
TM59NW166	0	0.15	Topsoil or Made Ground
TM59NW166	0.15	2.5	Lowestoft Till
TM59NW166	2.5	12	Corton Beds
TM59NW167	0	7.2	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW167	7.2	8.5	Crag (Norwich Crag and Red Crag)
TM59NW167	8.5	10	London Clay
TM59NW17	0	16.1	Corton Beds
TM59NW17	16.1	21.7	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW17	21.7	28.8	Crag (Norwich Crag and Red Crag)
TM59NW18	0	1.9	Lowestoft Till
TM59NW18	1.9	17.6	Corton Beds
TM59NW18	17.6	19	Crag (Norwich Crag and Red Crag)
TM59NW19	0	3.1	Lowestoft Till
TM59NW19	3.1	21.2	Corton Beds
TM59NW19	21.2	30	Crag (Norwich Crag and Red Crag)
TM59NW20	0	1.8	Lowestoft Till
TM59NW20	1.8	5.6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW20	5.6	11.1	Crag (Norwich Crag and Red Crag)
TM59NW21	0	7.2	Corton Beds
TM59NW21	7.2	9.1	Crag (Norwich Crag and Red Crag)
TM59NW22	0	4.5	Lowestoft Till
TM59NW22	4.5	17.8	Corton Beds
TM59NW22	17.8	22.6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW22	22.6	32.1	Crag (Norwich Crag and Red Crag)
TM59NW23	0	10.5	Corton Beds
TM59NW23	10.5	13.2	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW23	13.2	26.6	Crag (Norwich Crag and Red Crag)
TM59NW24	0	1.1	Corton Beds
TM59NW24	1.1	8.7	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW24	8.7	20	Crag (Norwich Crag and Red Crag)
TM59NW26	0	5.9	Lowestoft Till
TM59NW26	5.9	15.6	Corton Beds
TM59NW26	15.6	22.8	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW26	22.8	27.7	Crag (Norwich Crag and Red Crag)

TM59NW27	0	3.2	Lowestoft Till
TM59NW27	3.2	10.7	Corton Beds
TM59NW27	10.7	17.3	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW27	17.3	25	Crag (Norwich Crag and Red Crag)
TM59NW29	0	1.4	Topsoil or Made Ground
TM59NW29	1.4	3.1	Terrace Gravel (Devensian)
TM59NW29	3.1	10.9	Lowestoft Till
TM59NW29	10.9	18.4	Corton Beds
TM59NW29	18.4	21	Crag (Norwich Crag and Red Crag)
TM59NW29	21	22	London Clay
TM59NW3	0	0.61	Topsoil or Made Ground
TM59NW3	0.61	5.41	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW3	5.41	6.1	Crag (Norwich Crag and Red Crag)
TM59NW32	0	2.9	Topsoil or Made Ground
TM59NW33	0	11.1	Topsoil or Made Ground
TM59NW33	11.1	15	Corton Beds
TM59NW34	0	0.9	Topsoil or Made Ground
TM59NW34	0.9	5.2	Crag (Norwich Crag and Red Crag)
TM59NW35	0	0.25	Topsoil or Made Ground
TM59NW35	0.25	11	Corton Beds
TM59NW36	0	0.8	Topsoil or Made Ground
TM59NW36	0.8	11	Corton Beds
TM59NW37	0	2	Topsoil or Made Ground
TM59NW38	0	1	Topsoil or Made Ground
TM59NW38	1	2	Crag (Norwich Crag and Red Crag)
TM59NW39	0	1	Topsoil or Made Ground
TM59NW39	1	2	Crag (Norwich Crag and Red Crag)
TM59NW4	0	1.52	Lowestoft Till
TM59NW4	1.52	4.88	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW4	4.88	6.35	Crag (Norwich Crag and Red Crag)
TM59NW40	0	0.61	Topsoil or Made Ground
TM59NW40	0.61	11.58	Lowestoft Till
TM59NW40	11.58	18.59	Corton Beds
TM59NW40	18.59	20.73	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW40	20.73	32.92	Crag (Norwich Crag and Red Crag)
TM59NW48	0	1.1	Topsoil or Made Ground
TM59NW48	1.1	5.6	Corton Beds
TM59NW49	0	0.9	Topsoil or Made Ground
TM59NW49	0.9	5	Corton Beds
TM59NW5	0	2.5	Terrace Gravel (Devensian)
TM59NW5	2.5	6.55	Lowestoft Till

TM59NW50	0	0.9	Topsoil or Made Ground
TM59NW50	0.9	5.5	Corton Beds
TM59NW51	0	0.4	Topsoil or Made Ground
TM59NW51	0.4	5	Corton Beds
TM59NW52	0	0.4	Topsoil or Made Ground
TM59NW52	0.4	5	Corton Beds
TM59NW53	0	0.35	Topsoil or Made Ground
TM59NW53	0.35	5	Corton Beds
TM59NW54	0	0.7	Topsoil or Made Ground
TM59NW54	0.7	10	Corton Beds
TM59NW55	0	0.8	Topsoil or Made Ground
TM59NW55	0.8	10	Corton Beds
TM59NW56	0	0.8	Topsoil or Made Ground
TM59NW56	0.8	2.9	Corton Beds
TM59NW56	2.9	10	London Clay
TM59NW57	0	0.9	Topsoil or Made Ground
TM59NW57	0.9	10	Corton Beds
TM59NW58	0	6.5	Topsoil or Made Ground
TM59NW58	6.5	10	Corton Beds
TM59NW6	0	0.3	Topsoil or Made Ground
TM59NW6	0.3	3.35	Terrace Gravel (Devensian)
TM59NW6	3.35	6.1	Lowestoft Till
TM59NW60	0	0.5	Topsoil or Made Ground
TM59NW60	0.5	10.05	Corton Beds
TM59NW61	0	0.6	Topsoil or Made Ground
TM59NW61	0.6	5.2	Corton Beds
TM59NW62	0	0.35	Topsoil or Made Ground
TM59NW62	0.35	3.2	Corton Beds
TM59NW62	3.2	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW63	0	0.55	Topsoil or Made Ground
TM59NW63	0.55	0.9	Alluvium (Composite Breydon Formation)
TM59NW63	0.9	2.3	Corton Beds
TM59NW63	2.3	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW64	0	0.6	Topsoil or Made Ground
TM59NW64	0.6	2.5	Corton Beds
TM59NW64	2.5	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW65	0	0.5	Topsoil or Made Ground
TM59NW65	0.5	5.1	Corton Beds
TM59NW65	5.1	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW66	0	0.6	Topsoil or Made Ground

TM59NW66	0.6	8.1	Corton Beds
TM59NW66	8.1	10	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59NW67	0	0.5	Topsoil or Made Ground
TM59NW67	0.5	1.5	Lowestoft Till
TM59NW67	1.5	10.2	Corton Beds
TM59NW68	0	0.45	Topsoil or Made Ground
TM59NW68	0.45	5	Corton Beds
TM59NW69	0	0.5	Topsoil or Made Ground
TM59NW69	0.5	5	Corton Beds
TM59NW7	0	2.44	Terrace Gravel (Devensian)
TM59NW7	2.44	5.33	Lowestoft Till
TM59NW7	5.33	6.1	Corton Beds
TM59NW70	0	0.3	Topsoil or Made Ground
TM59NW70	0.3	5.6	Corton Beds
TM59NW71	0	0.6	Topsoil or Made Ground
TM59NW71	0.6	5.2	Corton Beds
TM59NW72	0	0.9	Topsoil or Made Ground
TM59NW72	0.9	5.55	Corton Beds
TM59NW73	0	1.2	Topsoil or Made Ground
TM59NW73	1.2	5.65	Corton Beds
TM59NW74	0	0.45	Topsoil or Made Ground
TM59NW74	0.45	4.5	Corton Beds
TM59NW75	0	0.6	Topsoil or Made Ground
TM59NW75	0.6	4.5	Corton Beds
TM59NW76	0	0.4	Topsoil or Made Ground
TM59NW76	0.4	4.5	Corton Beds
TM59NW77	0	3.7	Topsoil or Made Ground
TM59NW77	3.7	4.4	Corton Beds
TM59NW8	0	3.96	Terrace Gravel (Devensian)
TM59NW8	3.96	4.88	Lowestoft Till
TM59NW8	4.88	6.1	Corton Beds
TM59NW9	0	0.61	Topsoil or Made Ground
TM59NW9	0.61	6.1	Corton Beds
TM59NW94	0	8.1	Topsoil or Made Ground
TM59NW94	8.1	15.74	Corton Beds
TM59NW95	0	5.6	Topsoil or Made Ground
TM59NW95	5.6	10	Corton Beds
TM59SE1	0	0.46	Topsoil or Made Ground
TM59SE1	0.46	2.74	Corton Beds
TM59SE1	2.74	6.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE10	0	1.52	Topsoil or Made Ground
TM59SE10	1.52	9.45	Pebbly Series (Kesgrave and Bytham Sands and Gravels)

TM59SE10	9.45	30.48	Crag (Norwich Crag and Red Crag)
TM59SE11	0	0.91	Topsoil or Made Ground
TM59SE11	0.91	1.83	Corton Beds
TM59SE11	1.83	6.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE11	6.1	8.53	Crag (Norwich Crag and Red Crag)
TM59SE12	0	0.91	Topsoil or Made Ground
TM59SE12	0.91	1.83	Corton Beds
TM59SE12	1.83	6.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE12	6.1	8.53	Crag (Norwich Crag and Red Crag)
TM59SE13	0	5.4	Corton Beds
TM59SE13	5.4	7.3	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE13	7.3	20	Crag (Norwich Crag and Red Crag)
TM59SE14	0	1.3	Topsoil or Made Ground
TM59SE14	1.3	6.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE14	6.4	15.9	Crag (Norwich Crag and Red Crag)
TM59SE14	15.9	20	London Clay
TM59SE15	0	0.2	Topsoil or Made Ground
TM59SE15	0.2	4.95	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE15	4.95	30	Crag (Norwich Crag and Red Crag)
TM59SE16	0	0.2	Topsoil or Made Ground
TM59SE16	0.2	4.6	Corton Beds
TM59SE16	4.6	5.9	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE16	5.9	15.8	Crag (Norwich Crag and Red Crag)
TM59SE16	15.8	20	London Clay
TM59SE17	0	0.2	Topsoil or Made Ground
TM59SE17	0.2	6.6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE17	6.6	16.5	Crag (Norwich Crag and Red Crag)
TM59SE17	16.5	20	London Clay
TM59SE18	0	0.8	Topsoil or Made Ground
TM59SE18	0.8	3.2	Lowestoft Till
TM59SE19	0	0.9	Topsoil or Made Ground
TM59SE19	0.9	3.1	Lowestoft Till
TM59SE2	0	0.9	Topsoil or Made Ground
TM59SE2	0.9	6.1	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE20	0	0.7	Topsoil or Made Ground
TM59SE20	0.7	2.9	Lowestoft Till
TM59SE21	0	1.1	Topsoil or Made Ground
TM59SE21	1.1	2.6	Lowestoft Till

TM59SE22	0	14.33	Terrace Gravel (Devensian)
TM59SE22	14.33	21.9	Lowestoft Till
TM59SE23	0	1.55	Topsoil or Made Ground
TM59SE23	1.55	6.2	Lowestoft Till
TM59SE23	6.2	9.95	Crag (Norwich Crag and Red Crag)
TM59SE24	0	1.65	Topsoil or Made Ground
TM59SE24	1.65	10	Crag (Norwich Crag and Red Crag)
TM59SE25	0	0.95	Topsoil or Made Ground
TM59SE25	0.95	20	Crag (Norwich Crag and Red Crag)
TM59SE26	0	1	Topsoil or Made Ground
TM59SE26	1	20.5	Lowestoft Till
TM59SE27	0	0.6	Topsoil or Made Ground
TM59SE27	0.6	10	Lowestoft Till
TM59SE28	0	0.65	Topsoil or Made Ground
TM59SE28	0.65	8.1	Lowestoft Till
TM59SE28	8.1	10	Crag (Norwich Crag and Red Crag)
TM59SE29	0	0.6	Topsoil or Made Ground
TM59SE29	0.6	7.9	Lowestoft Till
TM59SE29	7.9	10	Crag (Norwich Crag and Red Crag)
TM59SE3	0	1.22	Topsoil or Made Ground
TM59SE3	1.22	3.05	Terrace Gravel (Devensian)
TM59SE3	3.05	10.67	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE30	0	0.46	Topsoil or Made Ground
TM59SE30	0.46	5.79	Terrace Gravel (Devensian)
TM59SE30	5.79	15.7	Lowestoft Till
TM59SE30	15.7	21.94	Crag (Norwich Crag and Red Crag)
TM59SE31	0	6	Topsoil or Made Ground
TM59SE31	6	11.7	Terrace Gravel (Devensian)
TM59SE31	11.7	27.5	Lowestoft Till
TM59SE32	0	0.1	Topsoil or Made Ground
TM59SE32	0.1	10.3	Terrace Gravel (Devensian)
TM59SE32	10.3	15.3	Lowestoft Till
TM59SE32	15.3	25	Corton Beds
TM59SE33	0	0.2	Topsoil or Made Ground
TM59SE33	0.2	10.8	Terrace Gravel (Devensian)
TM59SE33	10.8	20.7	Lowestoft Till
TM59SE33	20.7	25	Crag (Norwich Crag and Red Crag)
TM59SE34	0	1.3	Topsoil or Made Ground
TM59SE34	1.3	13.5	Terrace Gravel (Devensian)
TM59SE34	13.5	25	Lowestoft Till
TM59SE4	0	0.61	Topsoil or Made Ground
TM59SE4	0.61	6.7	Lowestoft Till
TM59SE4	6.7	9.09	Crag (Norwich Crag and Red Crag)
TM59SE5	0	0.76	Topsoil or Made Ground

TM59SE5	0.76	7.01	Lowestoft Till
TM59SE5	7.01	9.3	Crag (Norwich Crag and Red Crag)
TM59SE58	0	1.6	Topsoil or Made Ground
TM59SE58	1.6	11.28	Terrace Gravel (Devensian)
TM59SE6	0	1.5	Topsoil or Made Ground
TM59SE6	1.5	11.3	Terrace Gravel (Devensian)
TM59SE6	11.3	23.8	Lowestoft Till
TM59SE6	23.8	62.5	Crag (Norwich Crag and Red Crag)
TM59SE7	0	0.91	Topsoil or Made Ground
TM59SE7	0.91	6.71	Terrace Gravel (Devensian)
TM59SE7	6.71	8.23	Lowestoft Till
TM59SE7	8.23	9.75	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE8	0	1.52	Topsoil or Made Ground
TM59SE8	1.52	9.45	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE8	9.45	10.31	Crag (Norwich Crag and Red Crag)
TM59SE9	0	8.53	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SE9	8.53	10.97	Crag (Norwich Crag and Red Crag)
TM59SW1	0	1.07	Topsoil or Made Ground
TM59SW1	1.07	2.44	Corton Beds
TM59SW1	2.44	6.55	Crag (Norwich Crag and Red Crag)
TM59SW1	6.55	10.36	London Clay
TM59SW100	0	1.5	Topsoil or Made Ground
TM59SW100	1.5	20	Lowestoft Till
TM59SW101	0	2	Topsoil or Made Ground
TM59SW101	2	20	Lowestoft Till
TM59SW102	0	3.15	Topsoil or Made Ground
TM59SW102	3.15	20	Lowestoft Till
TM59SW103	0	3.2	Topsoil or Made Ground
TM59SW103	3.2	24.35	Lowestoft Till
TM59SW103	24.35	30	Crag (Norwich Crag and Red Crag)
TM59SW104	0	4.35	Topsoil or Made Ground
TM59SW104	4.35	23.55	Lowestoft Till
TM59SW104	23.55	30	Crag (Norwich Crag and Red Crag)
TM59SW105	0	3.9	Topsoil or Made Ground
TM59SW105	3.9	23.85	Lowestoft Till
TM59SW105	23.85	25	Crag (Norwich Crag and Red Crag)
TM59SW106	0	4.25	Topsoil or Made Ground
TM59SW106	4.25	24.8	Lowestoft Till
TM59SW106	24.8	30	Crag (Norwich Crag and Red Crag)
TM59SW107	0	1.7	Alluvium (Composite Breydon Formation)
TM59SW107	1.7	24.3	Lowestoft Till

TM59SW107	24.3	25.05	Crag (Norwich Crag and Red Crag)
TM59SW108	0	2.5	Alluvium (Composite Breydon Formation)
TM59SW108	2.5	16.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW108	16.5	40.7	Crag (Norwich Crag and Red Crag)
TM59SW109	0	3.9	Alluvium (Composite Breydon Formation)
TM59SW109	3.9	17.1	Lowestoft Till
TM59SW109	17.7	25.15	Crag (Norwich Crag and Red Crag)
TM59SW110	0	2.6	Alluvium (Composite Breydon Formation)
TM59SW110	2.6	15.2	Lowestoft Till
TM59SW110	15.2	29.6	Crag (Norwich Crag and Red Crag)
TM59SW111	0	1.5	Alluvium (Composite Breydon Formation)
TM59SW111	1.5	15.1	Lowestoft Till
TM59SW111	15.1	25.05	Crag (Norwich Crag and Red Crag)
TM59SW112	0	1	Alluvium (Composite Breydon Formation)
TM59SW112	1	15	Lowestoft Till
TM59SW112	15	40	Crag (Norwich Crag and Red Crag)
TM59SW113	0	0.4	Alluvium (Composite Breydon Formation)
TM59SW113	0.4	15.2	Lowestoft Till
TM59SW113	15.2	25	Crag (Norwich Crag and Red Crag)
TM59SW114	0	0.7	Alluvium (Composite Breydon Formation)
TM59SW114	0.7	14.6	Lowestoft Till
TM59SW114	14.6	26.95	Crag (Norwich Crag and Red Crag)
TM59SW115	0	0.6	Alluvium (Composite Breydon Formation)
TM59SW115	0.6	14.4	Lowestoft Till
TM59SW115	14.4	35	Crag (Norwich Crag and Red Crag)
TM59SW116	0	0.7	Alluvium (Composite Breydon Formation)
TM59SW116	0.7	15.4	Lowestoft Till
TM59SW116	15.4	30.6	Crag (Norwich Crag and Red Crag)
TM59SW117	0	4	Topsoil or Made Ground
TM59SW117	4	5.4	Alluvium (Composite Breydon Formation)
TM59SW117	5.4	25	Lowestoft Till
TM59SW117	25	30	Crag (Norwich Crag and Red Crag)
TM59SW118	0	3.5	Topsoil or Made Ground
TM59SW118	3.5	6.5	Alluvium (Composite Breydon Formation)
TM59SW118	6.5	21	Lowestoft Till

TM59SW118	21	30	Crag (Norwich Crag and Red Crag)
TM59SW119	0	2	Topsoil or Made Ground
TM59SW119	2	8	Alluvium (Composite Breydon Formation)
TM59SW119	8	26	Lowestoft Till
TM59SW119	26	30	Crag (Norwich Crag and Red Crag)
TM59SW120	0	2.3	Topsoil or Made Ground
TM59SW121	0	24.5	Lowestoft Till
TM59SW121	24.5	30	Crag (Norwich Crag and Red Crag)
TM59SW122	0	2	Topsoil or Made Ground
TM59SW123	0	4	Topsoil or Made Ground
TM59SW123	4	4.5	Alluvium (Composite Breydon Formation)
TM59SW123	4.5	5	Middle Peat (Breydon Formation)
TM59SW123	5	23	Lowestoft Till
TM59SW123	23	30	Crag (Norwich Crag and Red Crag)
TM59SW124	0	1.7	Topsoil or Made Ground
TM59SW124	1.7	6	Alluvium (Composite Breydon Formation)
TM59SW124	6	25	Lowestoft Till
TM59SW124	25	30	Crag (Norwich Crag and Red Crag)
TM59SW125	0	1.3	Topsoil or Made Ground
TM59SW125	1.3	3.7	Alluvium (Composite Breydon Formation)
TM59SW125	3.7	25.2	Lowestoft Till
TM59SW125	25.2	30	Crag (Norwich Crag and Red Crag)
TM59SW126	0	2	Topsoil or Made Ground
TM59SW126	2	4	Alluvium (Composite Breydon Formation)
TM59SW126	4	25	Lowestoft Till
TM59SW127	0	5	Topsoil or Made Ground
TM59SW127	5	23.7	Lowestoft Till
TM59SW127	23.7	25	Crag (Norwich Crag and Red Crag)
TM59SW128	0	2.5	Topsoil or Made Ground
TM59SW128	2.5	3.5	Alluvium (Composite Breydon Formation)
TM59SW128	3.5	24.25	Lowestoft Till
TM59SW128	24.25	25	Crag (Norwich Crag and Red Crag)
TM59SW129	0	1.7	Topsoil or Made Ground
TM59SW129	1.7	24.7	Lowestoft Till
TM59SW129	24.7	25	Crag (Norwich Crag and Red Crag)
TM59SW130	0	2	Topsoil or Made Ground
TM59SW130	2	10	Lowestoft Till
TM59SW131	0	2	Topsoil or Made Ground
TM59SW131	2	4	Alluvium (Composite Breydon Formation)

TM59SW131	4	25	Lowestoft Till
TM59SW132	0	2.9	Topsoil or Made Ground
TM59SW132	2.9	10.5	Lowestoft Till
TM59SW133	0	2	Topsoil or Made Ground
TM59SW133	2	3.5	Alluvium (Composite Breydon Formation)
TM59SW133	3.5	21.5	Lowestoft Till
TM59SW133	21.5	25	Crag (Norwich Crag and Red Crag)
TM59SW134	0	2.75	Topsoil or Made Ground
TM59SW134	2.75	5.5	Alluvium (Composite Breydon Formation)
TM59SW134	5.5	15	Lowestoft Till
TM59SW135	0	3.5	Topsoil or Made Ground
TM59SW135	3.5	10	Lowestoft Till
TM59SW136	0	1.5	Topsoil or Made Ground
TM59SW136	1.5	10	Lowestoft Till
TM59SW137	0	1.5	Topsoil or Made Ground
TM59SW137	1.5	5	Lowestoft Till
TM59SW138	0	3	Topsoil or Made Ground
TM59SW138	3	10	Lowestoft Till
TM59SW139	0	0.7	Topsoil or Made Ground
TM59SW139	0.7	10	Lowestoft Till
TM59SW140	0	1.2	Topsoil or Made Ground
TM59SW140	1.2	5	Lowestoft Till
TM59SW141	0	1	Topsoil or Made Ground
TM59SW141	1	5	Lowestoft Till
TM59SW142	0	1.7	Topsoil or Made Ground
TM59SW142	1.7	5	Lowestoft Till
TM59SW143	0	2.35	Topsoil or Made Ground
TM59SW143	2.35	5.5	Lowestoft Till
TM59SW144	0	1.25	Topsoil or Made Ground
TM59SW144	1.25	3.2	Lowestoft Till
TM59SW144	3.2	5	Corton Beds
TM59SW145	0	0.55	Topsoil or Made Ground
TM59SW145	0.55	5	Corton Beds
TM59SW146	0	1.3	Topsoil or Made Ground
TM59SW146	1.3	5	Corton Beds
TM59SW147	0	2.75	Topsoil or Made Ground
TM59SW147	2.75	5.5	Corton Beds
TM59SW148	0	1.2	Topsoil or Made Ground
TM59SW148	1.2	10	Corton Beds
TM59SW149	0	0.7	Topsoil or Made Ground
TM59SW149	0.7	0.9	Lowestoft Till
TM59SW149	0.9	15	Corton Beds
TM59SW151	0	2.6	Topsoil or Made Ground

TM59SW151	2.6	6.4	Lowestoft Till
TM59SW151	6.4	15	Corton Beds
TM59SW152	0	0.9	Topsoil or Made Ground
TM59SW152	0.9	15	Corton Beds
TM59SW153	0	0.8	Topsoil or Made Ground
TM59SW153	0.8	20	Corton Beds
TM59SW154	0	0.3	Topsoil or Made Ground
TM59SW154	0.3	30	Corton Beds
TM59SW155	0	1.9	Topsoil or Made Ground
TM59SW155	1.9	6.4	Lowestoft Till
TM59SW155	6.4	30	Corton Beds
TM59SW156	0	1.8	Topsoil or Made Ground
TM59SW156	1.8	7.4	Lowestoft Till
TM59SW156	7.4	15	Corton Beds
TM59SW157	0	0.9	Topsoil or Made Ground
TM59SW157	0.9	20	Corton Beds
TM59SW158	0	2	Topsoil or Made Ground
TM59SW158	2	30	Corton Beds
TM59SW159	0	0.4	Topsoil or Made Ground
TM59SW159	0.4	20	Corton Beds
TM59SW16	0	0.25	Topsoil or Made Ground
TM59SW16	0.25	3	Lowestoft Till
TM59SW160	0	0.5	Topsoil or Made Ground
TM59SW160	0.5	15	Corton Beds
TM59SW161	0	0.5	Topsoil or Made Ground
TM59SW161	0.5	20	Corton Beds
TM59SW162	0	1.06	Topsoil or Made Ground
TM59SW162	1.06	20	Corton Beds
TM59SW163	0	2.75	Topsoil or Made Ground
TM59SW163	2.75	15	Corton Beds
TM59SW164	0	1.2	Topsoil or Made Ground
TM59SW164	1.2	15	Corton Beds
TM59SW165	0	3.8	Topsoil or Made Ground
TM59SW165	3.8	9	Lowestoft Till
TM59SW165	9	15	Corton Beds
TM59SW166	0	3.2	Topsoil or Made Ground
TM59SW166	3.2	15	Corton Beds
TM59SW167	0	0.9	Topsoil or Made Ground
TM59SW167	0.9	5.9	Lowestoft Till
TM59SW167	5.9	10.2	Corton Beds
TM59SW168	0	2.5	Topsoil or Made Ground
TM59SW168	2.5	6.8	Lowestoft Till
TM59SW168	6.8	10.2	Corton Beds
TM59SW169	0	1.6	Topsoil or Made Ground

TM59SW169	1.6	6.8	Lowestoft Till
TM59SW169	6.8	10	Corton Beds
TM59SW170	0	0.75	Topsoil or Made Ground
TM59SW170	0.75	6.7	Lowestoft Till
TM59SW170	6.7	10.3	Corton Beds
TM59SW171	0	1.5	Topsoil or Made Ground
TM59SW171	1.5	5.5	Lowestoft Till
TM59SW172	0	1	Topsoil or Made Ground
TM59SW172	1	3.9	Lowestoft Till
TM59SW172	3.9	5.5	Corton Beds
TM59SW173	0	0.9	Topsoil or Made Ground
TM59SW173	0.9	5.5	Corton Beds
TM59SW174	0	1.6	Topsoil or Made Ground
TM59SW174	1.6	5	Corton Beds
TM59SW175	0	0.9	Topsoil or Made Ground
TM59SW175	0.9	5	Corton Beds
TM59SW176	0	0.75	Topsoil or Made Ground
TM59SW176	0.75	5	Corton Beds
TM59SW177	0	0.4	Topsoil or Made Ground
TM59SW177	0.4	5	Corton Beds
TM59SW178	0	0.8	Topsoil or Made Ground
TM59SW178	0.8	5	Corton Beds
TM59SW179	0	1.7	Topsoil or Made Ground
TM59SW179	1.7	5	Corton Beds
TM59SW180	0	0.4	Topsoil or Made Ground
TM59SW180	0.4	5.5	Corton Beds
TM59SW181	0	0.35	Topsoil or Made Ground
TM59SW181	0.35	5	Corton Beds
TM59SW182	0	0.85	Topsoil or Made Ground
TM59SW182	0.85	5.45	Corton Beds
TM59SW193	0	0.15	Topsoil or Made Ground
TM59SW193	0.15	4.3	Lowestoft Till
TM59SW194	0	0.4	Topsoil or Made Ground
TM59SW194	0.4	3.5	Corton Beds
TM59SW195	0	0.2	Topsoil or Made Ground
TM59SW195	0.2	4.6	Corton Beds
TM59SW196	0	0.35	Topsoil or Made Ground
TM59SW196	0.35	4.5	Corton Beds
TM59SW197	0	0.3	Topsoil or Made Ground
TM59SW197	0.3	4.3	Lowestoft Till
TM59SW197	4.3	4.5	Corton Beds
TM59SW198	0	1.1	Topsoil or Made Ground
TM59SW198	1.1	4.5	Corton Beds
TM59SW199	0	0.6	Topsoil or Made Ground

TM59SW199	0.6	3.9	Corton Beds
TM59SW2	0	2.59	Topsoil or Made Ground
TM59SW2	2.59	3.96	Middle Peat (Breydon Formation)
TM59SW2	3.96	4.57	Lower Clay (Breydon Formation)
TM59SW2	4.57	18.44	Lowestoft Till
TM59SW200	0	0.8	Topsoil or Made Ground
TM59SW200	0.8	4.5	Corton Beds
TM59SW201	0	2.7	Topsoil or Made Ground
TM59SW201	2.7	3.8	Corton Beds
TM59SW202	0	2.1	Topsoil or Made Ground
TM59SW202	2.1	4	Corton Beds
TM59SW203	0	2.5	Topsoil or Made Ground
TM59SW204	0	1.8	Topsoil or Made Ground
TM59SW204	1.8	4.5	Corton Beds
TM59SW205	0	1.4	Topsoil or Made Ground
TM59SW205	1.4	4.4	Lowestoft Till
TM59SW206	0	0.7	Topsoil or Made Ground
TM59SW206	0.7	4.3	Corton Beds
TM59SW207	0	0.2	Topsoil or Made Ground
TM59SW207	0.2	4.5	Corton Beds
TM59SW208	0	1.7	Topsoil or Made Ground
TM59SW208	1.7	4.3	Corton Beds
TM59SW209	0	2.3	Topsoil or Made Ground
TM59SW21	0	3	Topsoil or Made Ground
TM59SW210	0	3	Topsoil or Made Ground
TM59SW211	0	3.3	Topsoil or Made Ground
TM59SW211	3.3	3.5	Alluvium (Composite Breydon Formation)
TM59SW211	3.5	4.8	Middle Peat (Breydon Formation)
TM59SW226	0	0.85	Topsoil or Made Ground
TM59SW226	0.85	13	Corton Beds
TM59SW226	13	15.45	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW227	0	1.9	Topsoil or Made Ground
TM59SW227	1.9	2.5	Lower Clay (Breydon Formation)
TM59SW227	2.5	10	Lowestoft Till
TM59SW228	0	1.7	Topsoil or Made Ground
TM59SW228	1.7	3.5	Lowestoft Till
TM59SW228	3.5	10	Corton Beds
TM59SW229	0	1.7	Topsoil or Made Ground
TM59SW229	1.7	6.8	Lowestoft Till
TM59SW229	6.8	10	Corton Beds
TM59SW230	0	1.2	Topsoil or Made Ground
TM59SW230	1.2	2.2	Alluvium (Composite Breydon Formation)

TM59SW230	2.2	5	Terrace Gravel (Devensian)
TM59SW230	5	5.2	Lowestoft Till
TM59SW230	5.2	10	Crag (Norwich Crag and Red Crag)
TM59SW270	0	1	Topsoil or Made Ground
TM59SW270	1	4	Terrace Gravel (Devensian)
TM59SW270	4	12	Corton Beds
TM59SW271	0	0.7	Topsoil or Made Ground
TM59SW271	0.7	5.5	Terrace Gravel (Devensian)
TM59SW271	5.5	10	Corton Beds
TM59SW273	0	0.5	Topsoil or Made Ground
TM59SW273	0.5	3	Lowestoft Till
TM59SW274	0	0.25	Topsoil or Made Ground
TM59SW274	0.25	3	Corton Beds
TM59SW275	0	0.4	Topsoil or Made Ground
TM59SW275	0.4	2	Lowestoft Till
TM59SW276	0	0.5	Topsoil or Made Ground
TM59SW276	0.5	1.7	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW276	1.7	2	Crag (Norwich Crag and Red Crag)
TM59SW277	0	0.5	Topsoil or Made Ground
TM59SW277	0.5	1.6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW277	1.6	3	Crag (Norwich Crag and Red Crag)
TM59SW278	0	0.4	Topsoil or Made Ground
TM59SW278	0.4	1.3	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW278	1.3	3	Crag (Norwich Crag and Red Crag)
TM59SW279	0	0.4	Topsoil or Made Ground
TM59SW279	0.4	2.2	Lowestoft Till
TM59SW279	2.2	2.5	Corton Beds
TM59SW280	0	0.3	Topsoil or Made Ground
TM59SW280	0.3	1	Lowestoft Till
TM59SW280	1	2.5	Corton Beds
TM59SW284	0	3.3	Topsoil or Made Ground
TM59SW284	3.3	12.4	Lowestoft Till
TM59SW284	12.4	13.1	Crag (Norwich Crag and Red Crag)
TM59SW285	0	3.2	Topsoil or Made Ground
TM59SW285	3.2	8.2	Lowestoft Till
TM59SW285	8.2	9.9	Corton Beds
TM59SW285	9.9	13	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW286	0	4.2	Topsoil or Made Ground
TM59SW286	4.2	15	Lowestoft Till
TM59SW287	0	2.5	Topsoil or Made Ground
TM59SW287	2.5	5.8	Lowestoft Till

TM59SW287	5.8	15	Corton Beds
TM59SW288	0	5.8	Topsoil or Made Ground
TM59SW288	5.8	6.8	Lowestoft Till
TM59SW288	6.8	10	Corton Beds
TM59SW289	0	1.4	Topsoil or Made Ground
TM59SW289	1.4	4.5	Terrace Gravel (Devensian)
TM59SW289	4.5	7.5	Corton Beds
TM59SW289	7.5	9	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW289	9	15	Crag (Norwich Crag and Red Crag)
TM59SW290	0	1.9	Topsoil or Made Ground
TM59SW290	1.9	2.6	Alluvium (Composite Breydon Formation)
TM59SW290	2.6	12	Corton Beds
TM59SW290	12	15	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW291	0	3	Topsoil or Made Ground
TM59SW291	3	7.5	Lowestoft Till
TM59SW291	7.5	10.4	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW291	10.4	15	Crag (Norwich Crag and Red Crag)
TM59SW292	0	2.2	Topsoil or Made Ground
TM59SW292	2.2	7.8	Lowestoft Till
TM59SW292	7.8	15	Corton Beds
TM59SW293	0	0.8	Topsoil or Made Ground
TM59SW293	0.8	1	Alluvium (Composite Breydon Formation)
TM59SW293	1	4.3	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW293	4.3	15	Crag (Norwich Crag and Red Crag)
TM59SW294	0	1.4	Topsoil or Made Ground
TM59SW294	1.4	1.9	Alluvium (Composite Breydon Formation)
TM59SW294	1.9	6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW294	6	18	Crag (Norwich Crag and Red Crag)
TM59SW295	0	9	Lowestoft Till
TM59SW295	9	15	Corton Beds
TM59SW295	15	20	Crag (Norwich Crag and Red Crag)
TM59SW296	0	0.5	Topsoil or Made Ground
TM59SW296	0.5	7.5	Lowestoft Till
TM59SW296	7.5	8.25	Crag (Norwich Crag and Red Crag)
TM59SW297	0	1.2	Topsoil or Made Ground
TM59SW297	1.2	10	Lowestoft Till
TM59SW298	0	2.5	Topsoil or Made Ground
TM59SW298	2.5	6.1	Lowestoft Till

TM59SW298	6.1	8	Corton Beds
TM59SW299	0	1.2	Topsoil or Made Ground
TM59SW299	1.2	6	Lowestoft Till
TM59SW300	0	0.9	Topsoil or Made Ground
TM59SW300	0.9	6	Lowestoft Till
TM59SW301	0	2.6	Topsoil or Made Ground
TM59SW301	2.6	10	Lowestoft Till
TM59SW302	0	1.3	Topsoil or Made Ground
TM59SW302	1.3	6.7	Lowestoft Till
TM59SW302	6.7	10	Corton Beds
TM59SW303	0	0.3	Topsoil or Made Ground
TM59SW303	0.3	5	Lowestoft Till
TM59SW303	5	15	Corton Beds
TM59SW304	0	0.1	Topsoil or Made Ground
TM59SW304	0.1	0.5	Terrace Gravel (Devensian)
TM59SW304	0.5	3.5	Corton Beds
TM59SW304	3.5	6	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW309	0	0.3	Topsoil or Made Ground
TM59SW309	0.3	3	Corton Beds
TM59SW311	0	1.7	Topsoil or Made Ground
TM59SW311	1.7	2.3	Lowestoft Till
TM59SW311	2.3	3	Corton Beds
TM59SW314	0	2	Topsoil or Made Ground
TM59SW314	2	2.6	Alluvium (Composite Breydon Formation)
TM59SW314	2.6	20	Crag (Norwich Crag and Red Crag)
TM59SW315	0	2	Topsoil or Made Ground
TM59SW315	2	22	Crag (Norwich Crag and Red Crag)
TM59SW315	22	23	London Clay
TM59SW316	0	1.5	Topsoil or Made Ground
TM59SW316	1.5	21.7	Crag (Norwich Crag and Red Crag)
TM59SW316	21.7	22.2	London Clay
TM59SW317	0	0.15	Topsoil or Made Ground
TM59SW317	0.15	11.65	Lowestoft Till
TM59SW318	0	1	Topsoil or Made Ground
TM59SW318	1	10.5	Crag (Norwich Crag and Red Crag)
TM59SW319	0	2.54	Topsoil or Made Ground
TM59SW319	2.54	11.35	Lowestoft Till
TM59SW319	11.35	11.7	Crag (Norwich Crag and Red Crag)
TM59SW320	0	2	Topsoil or Made Ground
TM59SW320	2	15	Crag (Norwich Crag and Red Crag)
TM59SW322	0	1	Topsoil or Made Ground
TM59SW322	1	12.2	Lowestoft Till

TM59SW322	12.2	15	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW357	0	1	Topsoil or Made Ground
TM59SW357	1	1.3	Middle Peat (Breydon Formation)
TM59SW357	1.3	8	Lower Clay (Breydon Formation)
TM59SW357	8	10	Corton Beds
TM59SW367	0	0.2	Topsoil or Made Ground
TM59SW367	0.2	6.4	Lowestoft Till
TM59SW367	6.4	15.4	Crag (Norwich Crag and Red Crag)
TM59SW369	0	0.6	Topsoil or Made Ground
TM59SW369	0.6	2.57	Terrace Gravel (Devensian)
TM59SW369	2.57	5.1	Lowestoft Till
TM59SW369	5.1	12.2	Corton Beds
TM59SW370	0	0.2	Topsoil or Made Ground
TM59SW370	0.2	3.4	Lowestoft Till
TM59SW370	3.4	15.1	Crag (Norwich Crag and Red Crag)
TM59SW377	0	0.9	Topsoil or Made Ground
TM59SW377	0.9	3.7	Cover Sand
TM59SW377	3.7	9	Lowestoft Till
TM59SW377	9	15.1	Crag (Norwich Crag and Red Crag)
TM59SW378	0	0.35	Topsoil or Made Ground
TM59SW378	0.35	4.8	Cover Sand
TM59SW378	4.8	8.5	Lowestoft Till
TM59SW378	8.5	10.9	Corton Beds
TM59SW378	10.9	15.2	Crag (Norwich Crag and Red Crag)
TM59SW379	0	0.4	Topsoil or Made Ground
TM59SW379	0.4	1.2	Cover Sand
TM59SW379	1.2	9.4	Lowestoft Till
TM59SW379	9.4	15.4	Crag (Norwich Crag and Red Crag)
TM59SW407	0	0.1	Topsoil or Made Ground
TM59SW407	0.1	4	Cover Sand
TM59SW407	4	9	Lowestoft Till
TM59SW407	9	10	Crag (Norwich Crag and Red Crag)
TM59SW465	0	1.1	Topsoil or Made Ground
TM59SW465	1.1	15.4	Crag (Norwich Crag and Red Crag)
TM59SW469	0	3.44	Upper Clay (Breydon Formation)
TM59SW469	3.44	5.39	Middle Peat (Breydon Formation)
TM59SW469	5.39	11.5	Crag (Norwich Crag and Red Crag)
TM59SW471	0	2.2	Upper Clay (Breydon Formation)
TM59SW471	2.2	3.2	Middle Peat (Breydon Formation)
TM59SW471	3.2	16.29	Crag (Norwich Crag and Red Crag)
TM59SW472	0	1.5	Upper Clay (Breydon Formation)
TM59SW472	1.5	4	Middle Peat (Breydon Formation)
TM59SW472	4	4.5	Corton Beds
TM59SW472	4.5	30.5	Crag (Norwich Crag and Red Crag)

TM59SW50	0	0.3	Topsoil or Made Ground
TM59SW50	0.3	0.8	Lower Clay (Breydon Formation)
TM59SW50	0.8	2.8	Lowestoft Till
TM59SW50	2.8	12.2	Corton Beds
TM59SW50	12.2	20	Crag (Norwich Crag and Red Crag)
TM59SW51	0	0.4	Topsoil or Made Ground
TM59SW51	0.4	0.7	Upper Clay (Breydon Formation)
TM59SW51	0.7	11.5	Corton Beds
TM59SW51	11.5	2	Crag (Norwich Crag and Red Crag)
TM59SW52	0	0.2	Topsoil or Made Ground
TM59SW52	0.2	0.8	Upper Clay (Breydon Formation)
TM59SW52	0.8	2.5	Lowestoft Till
TM59SW52	2.5	10	Crag (Norwich Crag and Red Crag)
TM59SW545	0	3.6	Cover Sand
TM59SW545	3.6	6.9	Lower Clay (Breydon Formation)
TM59SW545	6.9	12	Crag (Norwich Crag and Red Crag)
TM59SW55	0	0.61	Lowestoft Till
TM59SW55	0.61	10.05	Corton Beds
TM59SW58	0	3.66	Lowestoft Till
TM59SW58	3.66	15.84	Corton Beds
TM59SW598	0	3.2	Topsoil or Made Ground
TM59SW598	3.2	6.5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW598	6.5	10	Crag (Norwich Crag and Red Crag)
TM59SW599	0	3.1	Topsoil or Made Ground
TM59SW599	3.1	3.2	Middle Peat (Breydon Formation)
TM59SW599	3.2	5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW60	0	0.31	Topsoil or Made Ground
TM59SW60	0.31	28.65	Lowestoft Till
TM59SW60	28.65	39.62	Crag (Norwich Crag and Red Crag)
TM59SW600	0	3	Topsoil or Made Ground
TM59SW600	3	3.1	Middle Peat (Breydon Formation)
TM59SW600	3.1	4.1	Corton Beds
TM59SW600	4.1	5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW601	0	3.1	Topsoil or Made Ground
TM59SW601	3.1	3.2	Middle Peat (Breydon Formation)
TM59SW601	3.2	5	Pebbly Series (Kesgrave and Bytham Sands and Gravels)
TM59SW601	5	10	Crag (Norwich Crag and Red Crag)
TM59SW61	0	8.53	Lowestoft Till
TM59SW613	0	1	Topsoil or Made Ground
TM59SW613	1	11	Crag (Norwich Crag and Red Crag)
TM59SW614	0	1.3	Topsoil or Made Ground

TM59SW614	1.3	11	Crag (Norwich Crag and Red Crag)
TM59SW62	0	0.61	Topsoil or Made Ground
TM59SW62	0.61	15.85	Lowestoft Till
TM59SW62	15.85	19.81	Crag (Norwich Crag and Red Crag)
TM59SW650	0	0.6	Topsoil or Made Ground
TM59SW650	0.6	10.8	Lowestoft Till
TM59SW650	10.8	15	Crag (Norwich Crag and Red Crag)
TM59SW651	0	0.7	Topsoil or Made Ground
TM59SW651	0.7	10.4	Lowestoft Till
TM59SW651	10.4	15	Crag (Norwich Crag and Red Crag)
TM59SW652	0	1.8	Topsoil or Made Ground
TM59SW652	1.8	11.2	Lowestoft Till
TM59SW652	11.2	15	Crag (Norwich Crag and Red Crag)
TM59SW653	0	0.8	Topsoil or Made Ground
TM59SW653	0.8	7	Lowestoft Till
TM59SW654	0	1.2	Topsoil or Made Ground
TM59SW654	1.2	7	Lowestoft Till
TM59SW655	0	0.3	Topsoil or Made Ground
TM59SW655	0.3	2.5	Lowestoft Till
TM59SW656	0	0.25	Topsoil or Made Ground
TM59SW656	0.25	2	Lowestoft Till
TM59SW657	0	0.6	Topsoil or Made Ground
TM59SW657	0.6	3	Lowestoft Till
TM59SW658	0	1.1	Topsoil or Made Ground
TM59SW658	1.1	2	Lowestoft Till
TM59SW660	0	1.1	Topsoil or Made Ground
TM59SW660	1.1	3	Lowestoft Till
TM59SW661	0	1.2	Topsoil or Made Ground
TM59SW661	1.2	3	Lowestoft Till
TM59SW662	0	0.6	Topsoil or Made Ground
TM59SW662	0.6	3	Lowestoft Till
TM59SW663	0	1.1	Topsoil or Made Ground
TM59SW663	1.1	3	Lowestoft Till
TM59SW664	0	0.8	Topsoil or Made Ground
TM59SW664	0.8	3	Lowestoft Till
TM59SW665	0	0.7	Topsoil or Made Ground
TM59SW665	0.7	3	Lowestoft Till
TM59SW666	0	1.1	Topsoil or Made Ground
TM59SW666	1.1	2	Lowestoft Till
TM59SW667	0	0.8	Topsoil or Made Ground
TM59SW667	0.8	2	Lowestoft Till
TM59SW668	0	0.3	Topsoil or Made Ground
TM59SW668	0.3	3.3	Lowestoft Till
TM59SW669	0	0.2	Topsoil or Made Ground

TM59SW669	0.2	3	Lowestoft Till
TM59SW670	0	0.4	Topsoil or Made Ground
TM59SW670	0.4	3.4	Lowestoft Till
TM59SW671	0	0.7	Topsoil or Made Ground
TM59SW671	0.7	1.1	Lowestoft Till
TM59SW68	0	1.1	Topsoil or Made Ground
TM59SW68	1.1	2	Middle Peat (Breydon Formation)
TM59SW68	2	2.6	Lower Clay (Breydon Formation)
TM59SW68	2.6	4	Lowestoft Till
TM59SW68	4	18.4	Crag (Norwich Crag and Red Crag)
TM59SW7	0	0.46	Topsoil or Made Ground
TM59SW7	0.46	2.19	Lowestoft Till
TM59SW7	2.19	6.1	Corton Beds
TM59SW73	0	0.8	Topsoil or Made Ground
TM59SW73	0.8	5.25	Alluvium (Composite Breydon Formation)
TM59SW73	5.25	10	Crag (Norwich Crag and Red Crag)
TM59SW74	0	3.4	Topsoil or Made Ground
TM59SW74	3.4	5	Lowestoft Till
TM59SW75	0	0.9	Middle Peat (Breydon Formation)
TM59SW75	0.9	1.5	Alluvium (Composite Breydon Formation)
TM59SW75	1.5	10	Lowestoft Till
TM59SW76	0	0.95	Middle Peat (Breydon Formation)
TM59SW76	0.95	1.25	Alluvium (Composite Breydon Formation)
TM59SW76	1.25	5	Lowestoft Till
TM59SW77	0	0.6	Topsoil or Made Ground
TM59SW77	0.6	1.5	Alluvium (Composite Breydon Formation)
TM59SW77	1.5	10	Lowestoft Till
TM59SW78	0	0.6	Topsoil or Made Ground
TM59SW78	0.6	6.3	Alluvium (Composite Breydon Formation)
TM59SW78	6.3	10	Lowestoft Till
TM59SW79	0	1.35	Topsoil or Made Ground
TM59SW79	1.35	5	Lowestoft Till
TM59SW8	0	0.61	Topsoil or Made Ground
TM59SW8	0.61	6.1	Lowestoft Till
TM59SW80	0	0.9	Topsoil or Made Ground
TM59SW80	0.9	1.5	Alluvium (Composite Breydon Formation)
TM59SW80	1.5	10	Lowestoft Till
TM59SW81	0	1.2	Middle Peat (Breydon Formation)
TM59SW81	1.2	5.5	Lowestoft Till
TM59SW82	0	2	Topsoil or Made Ground

TM59SW82	2	5.5	Lowestoft Till
TM59SW83	0	2	Topsoil or Made Ground
TM59SW83	2	3	Alluvium (Composite Breydon Formation)
TM59SW83	3	10	Lowestoft Till
TM59SW84	0	1.2	Middle Peat (Breydon Formation)
TM59SW84	1.2	5.5	Lowestoft Till
TM59SW85	0	1.2	Alluvium (Composite Breydon Formation)
TM59SW85	1.2	10	Lowestoft Till
TM59SW86	0	1.03	Lowestoft Till
TM59SW86	1.03	5	Lowestoft Till
TM59SW87	0	0.25	Topsoil or Made Ground
TM59SW87	0.25	1.35	Alluvium (Composite Breydon Formation)
TM59SW87	1.35	10	Lowestoft Till
TM59SW88	0	0.4	Topsoil or Made Ground
TM59SW88	0.4	1.9	Middle Peat (Breydon Formation)
TM59SW88	1.9	5	Lowestoft Till
TM59SW89	0	0.5	Topsoil or Made Ground
TM59SW89	0.5	1.2	Middle Peat (Breydon Formation)
TM59SW89	1.2	10	Lowestoft Till
TM59SW90	0	0.35	Topsoil or Made Ground
TM59SW90	0.35	5	Lowestoft Till
TM59SW91	0	0.45	Topsoil or Made Ground
TM59SW91	0.45	1.7	Alluvium (Composite Breydon Formation)
TM59SW91	1.7	5	Lowestoft Till
TM59SW92	0	3.85	Topsoil or Made Ground
TM59SW92	3.85	4.7	Alluvium (Composite Breydon Formation)
TM59SW92	4.7	10	Lowestoft Till
TM59SW93	0	4.9	Topsoil or Made Ground
TM59SW93	4.9	5.5	Alluvium (Composite Breydon Formation)
TM59SW94	0	4.2	Topsoil or Made Ground
TM59SW94	4.2	5	Alluvium (Composite Breydon Formation)
TM59SW95	0	3.65	Topsoil or Made Ground
TM59SW95	3.65	4.45	Middle Peat (Breydon Formation)
TM59SW95	4.45	5	Lower Clay (Breydon Formation)
TM59SW96	0	2.25	Topsoil or Made Ground
TM59SW96	2.25	10	Lowestoft Till
TM59SW97	0	0.7	Alluvium (Composite Breydon Formation)
TM59SW97	0.7	5.5	Lowestoft Till

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