Managing Archaeological Landscapes in Northumberland

TILL-TWEED STUDIES VOLUME 1

David G. Passmore and Clive Waddington

MANAGING ARCHAEOLOGICAL LANDSCAPES IN NORTHUMBERLAND

Till Tweed Studies

Volume 1

by

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Front cover: View west across the Milfield plain towards Glendale with Yeavering Bell the first prominent hill on the left.

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For Brian and Christine Waddington

Contents

List of Figures

Chapter 3

Chapter 5

Chapter 6

Chapter 7

Appendix A

Appendix B

List of Tables

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Summary

This study was originally established in the mid 1990s in response to the impacts of development, particularly sand and gravel extraction, in the Till-Tweed river catchments. It was funded through English Heritage and Defra's Aggregate Levy Sustainability Fund. There has been a long history of sustained aggregate extraction across the Till-Tweed catchment – an area that contains outstanding archaeological and palaeoenvironmental remains which have been, in general, only poorly understood. This study has assembled detailed baseline data that will provide a platform for future landscape-based research and site-based investigation as well as information that will underpin the future management of this archaeologically-rich landscape. The study area extends from the upper reaches of the Till valley through the Milfield Basin and the lower Tweed valley downstream from Coldstream to the North Sea coast at Berwick.

This monograph is accompanied by a companion volume that deals specifically with presenting an integrated archaeological and historical synthesis for the whole region. The approach taken by the authors comprises a landscape, or geoarchaeological, perspective, whereby the associations between archaeological remains, landforms and palaeoenvironmental information are reflected in the adoption of complementary methodologies geared towards the provision of an explicit approach to archaeological landscape management.

This study has developed a management tool for use by Northumberland County Council to assist with the future management of north Northumberland's historic environment. The methodology and management tool are described in Chapter 6 and complement the summary guidance document that has been published separately (Waddington and Passmore 2005). This method is based on the partition of the landscape into landform elements that have a known potential for hosting archaeological and palaeoenvironmental remains of different types and periods. This management tool, together with a copy of the GIS resource that contains all the mapped information, is available to planners, curators and developers/mineral operators working in the region. Moreover, this landscape management tool will also provide a transparent and easily comprehended record of sensitive archaeological and palaeoenvironmental sites which, in turn, will allow the rationale behind decision-making to be more widely understood. By providing this information across different sectors, this guidance will raise awareness of the archaeological and palaeoenvironmental resource and provide a common basis from which strategic planning can flow.

Clive Waddington and David G. Passmore
May 2008

Résumé

L'origine de cette étude remonte au milieu des années 1990, en réponse à l'impact du développement industriel, en particulier l'extraction de sable et de gravier, dans le bassin de la rivière Till-Tweed. C'est l'organisme britannique de protection du patrimoine historique, *English Heritage*, et *Aggregate Levy Sustainability Fund*, caisse du Ministère de l'agriculture britannique, *Defra*, qui ont financé cette étude. Pendant longtemps, le bassin de la Till-Tweed, zone renfermant des vestiges archéologiques et paléoenvironnementaux exceptionnels qui n'ont été en général qu'assez mal compris, a fait l'objet d'extractions intensives d'agrégats. Cette étude regroupe des données initiales détaillées qui serviront de plateforme aux recherches à venir sur les paysages et les sites, ainsi que des informations qui seront à la base de la gestion future de ce paysage riche en archéologie. La zone d'étude s'étend de la haute vallée de la Till jusqu'à la côte de la mer du nord à Berwick, en passant par le Bassin de Milfield et la basse vallée de la Tweed en aval de Coldstream.

À cette monographie s'ajoute un autre volume spécifiquement dédié à la présentation d'une synthèse archéologique et historique intégrée de la région entière. Les auteurs ont choisi d'adopter une démarche qui comprend un point de vue paysagiste, ou géoarchéologique, grâce auquel les relations entre vestiges archéologiques, configuration du terrain et informations paléoenvironnementales se retrouvent dans le choix de méthodes complémentaires. Celles-ci ont pour but de fournir une approche claire à la gestion des paysages archéologiques.

Cette étude a mis au point un outil de gestion qui sera utilisé par le conseil régional du Northumberland, afin de l'aider à l'administration future du patrimoine historique du nord de la région. La méthodologie et l'outil de gestion sont décrits dans le chapitre 6, et complètent le document d'information récapitulatif publié séparément (Waddington et Passmore 2005). Cette méthode est basée sur la division du paysage en éléments topographiques où il est reconnu que des restes archéologiques et paléoenvironnementaux de différents types et périodes ont de fortes chances de se trouver. Cet outil de gestion, ainsi qu'une copie de la ressource SIG qui contient toutes les informations cartographiées, est à la disposition des urbanistes, conservateurs, promoteurs, et exploitants de mines travaillant dans la région. De plus, cet outil de gestion du paysage fournira aussi un registre transparent et facile à comprendre des sites archéologiques et paléoenvironnementaux menacés, lequel permettra alors aux décisions adoptées d'être mieux comprises par tous. Cette information, disponible dans plusieurs secteurs, entraînera une prise de conscience des ressources archéologiques et paléoenvironnementales, et fournira une base commune sur laquelle le développement stratégique pourra s'appuyer.

Clive Waddington et Dave Passmore
Mai 2008

Traduit par Sterenn Girard-Suard

Zuasammenfassung

Dieses Forschungsprojekt begann ursprünglich Mitte der 1990er Jahre als Reaktion auf die Auswirkungen von Extraktionsvorhaben, speziell der Gewinnung von Sand und Kies, im Einzugsgebiet der Flüsse Till und Tweed. Die Finanzierung übernahmen English Heritage und der Aggregate Levy Sustainability Fund der Defra. Rohstoffgewinnung hat eine lange Geschichte in den Einzugsgebieten des Till und des Tweed – einem Gebiet, das außergewöhnliche archäologische und paläoökologische Hinterlassenschaften umfasst, die im Allgemeinen nur unzulänglich untersucht worden sind. Die vorliegende Studie hat einen detaillierten Grundstock an Daten zusammengetragen, der einen Ausgangspunkt für zukünftige landschafts- und fundplatzorientierte Forschungen bietet, sowie Informationen erbracht, die die zukünftige denkmalpflegerische Verwaltung dieser archäologisch reichen Landschaft untermauern werden. Das Forschungsgebiet erstreckt sich vom oberen Tilltal über das Milfield Basin und das untere Tweedtal, dann stromabwärts von Coldstream zur Nordseeküste bei Berwick.

Der Begleitband zur vorliegenden Monographie befasst sich eigens mit der Präsentation einer ganzheitlichen archäologischen und historischen Synthese für das gesamte Gebiet. Der Ansatz der Autoren beinhaltet eine landschafts- bzw. geoarchäologische Perspektive, in der die Zusammenhänge zwischen archäologischen Hinterlassenschaften, Relief und paläoökologischen Informationen sich in der Wahl komplementärer Methoden spiegeln, die auf den Aufbau einer expliziten Strategie für die Verwaltung dieser archäologischen Landschaft abzielen.

Im Zuge dieser Studie wurde für die Behörden des Northumberland County Council eine neue Verwaltungsfunktion für die zukünftige denkmalpflegerische Betreuung der historischen Landschaften Nordnorthumberlands entwickelt. Methodologische Aspekte und die Funktion selbst werden in Kapitel 6 beschrieben und ergänzen das zusammenfassende und separat veröffentlichte Empfehlungsdokument (Waddington and Passmore 2005). Die Methode gründet auf der Aufteilung der Landschaft in Reliefelemente, die ein bekanntes Potential für das Vorkommen archäologischer und paläoökologischer Hinterlassenschaften bestimmter Arten und Perioden aufweisen. Die Verwaltungsfunktion, sowie eine Kopie der GIS-Anwendung, die alle kartierten Informationen enthält, ist Landschaftsplanern, Kuratoren und Bau- bzw. Extraktionsfirmen, die in der Gegend arbeiten, zugänglich. Zusätzlich erzeugt diese neue Methode zur Landschaftsverwaltung ein transparentes und leicht verständliches Archiv empfindlicher archäologischer und paläoökologischer Fundstellen, was die Gründe für bestimmte Entscheidungen in Zukunft verständlicher machen wird. Dadurch dass Informationen für verschiedene Sektoren zugänglich sind, schaffen diese Empfehlungen ein erhöhtes Bewusstsein für archäologische und paläoökologische Quellen, sowie eine gemeinsame Grundlage für weitere strategische Planungsvorhaben.

Clive Waddington und Dave Passmore
Mai 2008

Samenvatting

Deze studie startte in het midden van de jaren '90, als reactie op de effecten van projectontwikkeling, met name zand- en grindafgravingen, in het stroomgebied van de Tweed en haar zijrivier de Till. Het project werd gefinancierd door English Heritage en het Aggregate Levy Sustainability Fund van DEFRA (Department for Environment, Food and Rural Affairs). Het Till/Tweed-stroomgebied, reeds sinds jaar en dag afgegraven voor aggregaat, is rijk aan zeer goed bewaard gebleven archeologisch en paleo-ecologisch materiaal waarover tot nu toe nog maar weinig bekend is. Voor deze studie werden gedetailleerde basisgegevens verzameld die als pijlers kunnen dienen waarop toekomstig onderzoek kan rusten, zowel op landschaps- als op site-niveau. Bovendien kunnen deze gegevens de basis leggen voor het beheer van dit archeologisch zo rijke landschap. Het studiegebied strekt zich uit van de bovenloop van de Till via het Milfield Bassin en de benedenloop van de Tweed stroomafwaarts vanaf Coldstream, tot aan de Noordzeekust bij Berwick.

Bij deze monografie hoort een begeleidend deel waarin een synthese van de archeologie en historie van de gehele regio wordt gepresenteerd. De auteurs hebben gekozen voor een landschaps- of geo-archeologische benadering. Vanuit dit perspectief wordt de samenhang tussen archeologisch erfgoed, landschapsvormen en paleo-ecologische informatie weerspiegeld in de toepassing van methoden die elkaar aanvullen en die zich lenen voor een duidelijk gedefinieerde benadering van archeologisch landschapsbeheer.

Middels dit project is voor het county-bestuur van Northumberland een instrument ontwikkeld dat als hulpmiddels kan dienen bij het toekomstig beheer van het historisch landschap van noord-Northumberland. De methodologie en het beheersinstrument, beschreven in Hoofdstuk 6, vormen een aanvulling op een apart gepubliceerd samenvattend adviserend document (Waddington en Passmore 2005). Bij deze methode wordt het landschap opgedeeld op basis van landschapselementen waarvan de potentiële archeologische en paleo-ecologische waarde bekend is (zowel qua type overblijfselen als periode). Dit instrument voor landschapsbeheer, en de bijbehorende GIS-informatie die de ruimtelijke representatie van de gegevens bevat, staan ter beschikking van allen die binnen de regio werkzaam zijn in planologie, erfgoedbeheer en projectontwikkeling, waaronder delfstoffenwinning. Bovendien voorziet dit beheersinstrument in een transparant en voor eenieder begrijpelijk archief van bedreigde archeologische en paleo-ecologische sites, wat weer kan leiden tot een breder begrip van de beweegredenen achter beslissingsprocessen. Door deze informatie aan verschillende sectoren te verstrekken, wordt een bewustmaking van archeologische en paleo-ecologische informatiebronnen in gang gezet, en kan een gemeenschappelijke basis worden gelegd voor strategische ruimtelijke ordening.

Clive Waddington en Dave Passmore
mei 2008

vertaling: Fine Line Archaeological Language Services

Sammenfatning

Nærværende studie blev indledt midt i 1990'erne, først og fremmest som svar på udvindingen af sand og grus i Till-Tweed flodsystemets afvandingsområde. Arbejdet blev finansieret gennem English Heritage og Department of Environment, Food and Rural Affairs Aggregate Levy Sustainability Fund. Udvindingen af sand og grus i Till-Tweed systemet har en lang historie bag sig. Generelt indeholder dette område arkæologiske og palæo-økologiske levn, som kun er dårligt forståede. Dette studie har samlet grundlæggende data, som kan fungere som en platform for fremtidig landskabsorienteret og lokalitetsbaseret forskning, såvel som information, der kan benyttes i forbindelse med den fremtidige administration af dette arkæologisk set rige område. Det undersøgte område strækker sig fra den øvre del af Till-dalen, gennem Millfield-bækkenet og den nedre del af Tweed-dalen, forbi Coldstream til Nordsøkysten ved Berwick.

Denne bog er ledsaget af et bind, hvis formål er at præsentere en integreret arkæologisk og historisk syntese for regionen. Forfatternes indfaldsvinkel har et klart landskabs- (eller geo-arkæologisk) perspektiv, hvorigennem det søges at omsætte forbindelserne mellem arkæologiske levn, landskabsformer og palæo-økologisk information i specifikke metoder og tilgangsformer for arkæologisk landskabsadministration.

I forbindelse med dette studie blev der udviklet en management-model for Northumberland County Council af betydning for den fremtidige administration af det nordlige Northumberlands historiske miljø. De benyttede metoder og management-modellen er beskrevet i Kapitel 6, der komplementerer et tidligere publiceret dokument med summariske retningslinjer (Waddington og Passmore 2005). Fremgangsmåden er baseret på en indeling af landskabsformer med højt potentiale for at indeholde arkæologiske/palæo-økologiske levn i arkæologiske/palæo-økologiske typer og perioder. Denne model, såvel som en kopi af et GIS program indeholdende al relevant kortlagt information, står til rådighed for planlæggere, museumsfolk, byggefirmaer og sand/grus udvindingsfirmaer i regionen. Denne management-model tilbyder også en klar og let forståelig oversigt over udsatte arkæologiske og palæo-økologiske lokaliteter, og den gør baggrunden for beslutninger taget i forbindelse med landskabsadministration mere letforståelig. Det er forfatternes håb, at den fremlagte information samt de retningslinjer, der foreslås i nærværende værk, vil øge bevidstheden om landskabets arkæologiske og palæo-økologiske rigdomme, og udgøre et fundament for fremtidig strategisk planlægning.


N
SCOTLAND
NORTH SEA
Till-Tweed Study Area
ENGLAND
0
200km

1 Introduction

David G. Passmore and Clive Waddington

> Here is abundant business for an antiquary; every place shows you ruined castles, Roman altars, inscriptions, monuments of battles, of heroes killed, and armies routed…
>
> (Defoe 1726, describing Northumberland in his travelogue 'A Tour Through the Whole Island of Great Britain')

SETTING THE SCENE

Managing archaeological remains presents an ongoing challenge for curators given the almost infinite diversity of deposits and their condition of preservation. In recent years the shortcomings of protecting individual sites, usually through a combination of designation and management agreements, has become apparent as many sites survive within what can be better understood as archaeological landscapes. Devising practical methods for the day to day management of landscapes that are considered archaeologically sensitive requires an approach that attempts to reconcile the unknown potential of discrete landscape areas with established records from similar landscape settings. Accordingly, the starting point for this study has been the recognition of the need for: 1) a 'landscape' scale approach to underpin management and decision making, and 2) an explicit and systematic way of partitioning the landscape according to archaeological potential. As the survival of all archaeological and palaeoenvironmental remains is ultimately dependent on geoarchaeological circumstances (e.g. Renfrew 1976; Butzer 1982; Waters 1992) it follows that by understanding the landscape as a patchwork of landform elements, each with its own distinctive geological, geomorphological, archaeological and palaeoenvironmental associations, a map-based characterisation of a given landscape can be constructed. In this study we have applied this approach to an area in North-East England and have classified a suite of landform elements that correspond to the age and character of the region's landscape. However, the general approach can be applied to any other region subject to acquiring an appropriate understanding of the geomorphology and archaeological resource specific to that area. It is hoped, therefore, that this study will serve as an illustration of an approach to archaeological landscape management that might usefully inform practice in other regions of the UK and beyond.

This volume, the first of two, presents the results of over a decade of geoarchaeological investigation by the two authors in north Northumberland, an area with outstanding archaeological remains but in a remote and somewhat neglected region abutting the Anglo-Scottish border. The work has been primarily funded by English Heritage in recognition of the sensitivity of the archaeological landscape to development pressures and the pressing need for a coherent management framework. Originally established as 'The Milfield Basin Geoarchaeology Project', the research was subsequently expanded to include a second 'Till-Tweed Geoarchaeology Project' and has drawn together data sets from a programme of research including fieldwalking, test pitting, evaluation trenching, aerial photographic interpretation, landform mapping, sediment coring and palaeoenvironmental analysis. In combination these investigations facilitate a multi-disciplinary analysis of the development of Late Quaternary landscapes and their archaeological associations in the valleys of the Till (known as the Breamish in its upper reaches), and lower Tweed, a continuous valley reach that extends from the uplands of the Cheviot massif to the North Sea coast at Berwick (Fig. 1.1). River valleys in this region appear to have provided foci for prehistoric and early historic communities since the arrival of the first hunter-gatherers, and the overarching geoarchaeological context of the research is intended to provide a conceptually sound basis for understanding landscape development, land use and settlement across north Northumberland from hill to coast. This theme will be developed in much greater detail in the second volume arising from the work (Passmore and Waddington in prep); the focus of this volume is the presentation of the project methodology, data and the development of a practical management framework for the Till-Tweed archaeological landscape.

The study area encompasses the valleys of the lower Tweed from Coldstream to Berwick, and the tributary

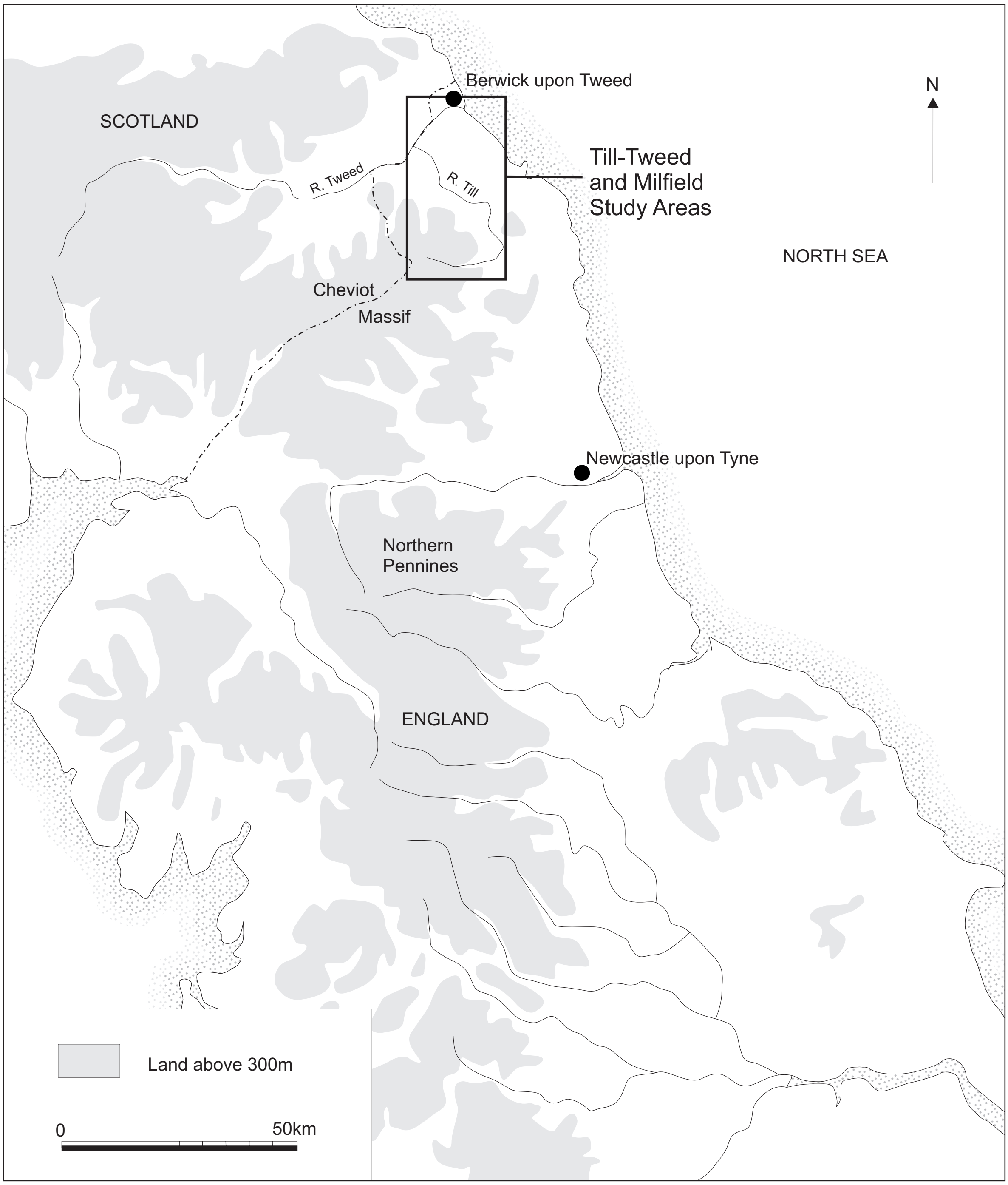


Fig. 1.1. Location of the Till-Tweed study area in North-East England.

valley of the Till from its confluence with the Tweed at Tweedmill upstream to Ingram (Fig. 1.2). The area of the Milfield Basin, in the middle reaches of the Till valley, has provided a key focus for agricultural production, settlement, strategic strongholds, centres of political power and historic battles. The area forms a large expanse of floodplain and upstanding sand and gravel terraces that are encircled by the steeply rising Cheviot Hills and Fell Sandstone escarpments. The fertile lands of the valley floor have been dubbed the 'breadbasket' of Northumberland as they provide a wide expanse of productive farmland that enjoys the effects of a warmer and drier microclimate than adjacent areas (Payton 1980).

Northumberland has become increasingly well known for its wealth of archaeological remains dating from the Mesolithic through to the medieval period (e.g. Harding 1981; Frodsham 2004; Hope-Taylor 1977; Miket 1981; 1985; Waddington 1999; 2007; Waddington and Passmore 2004), with many of these

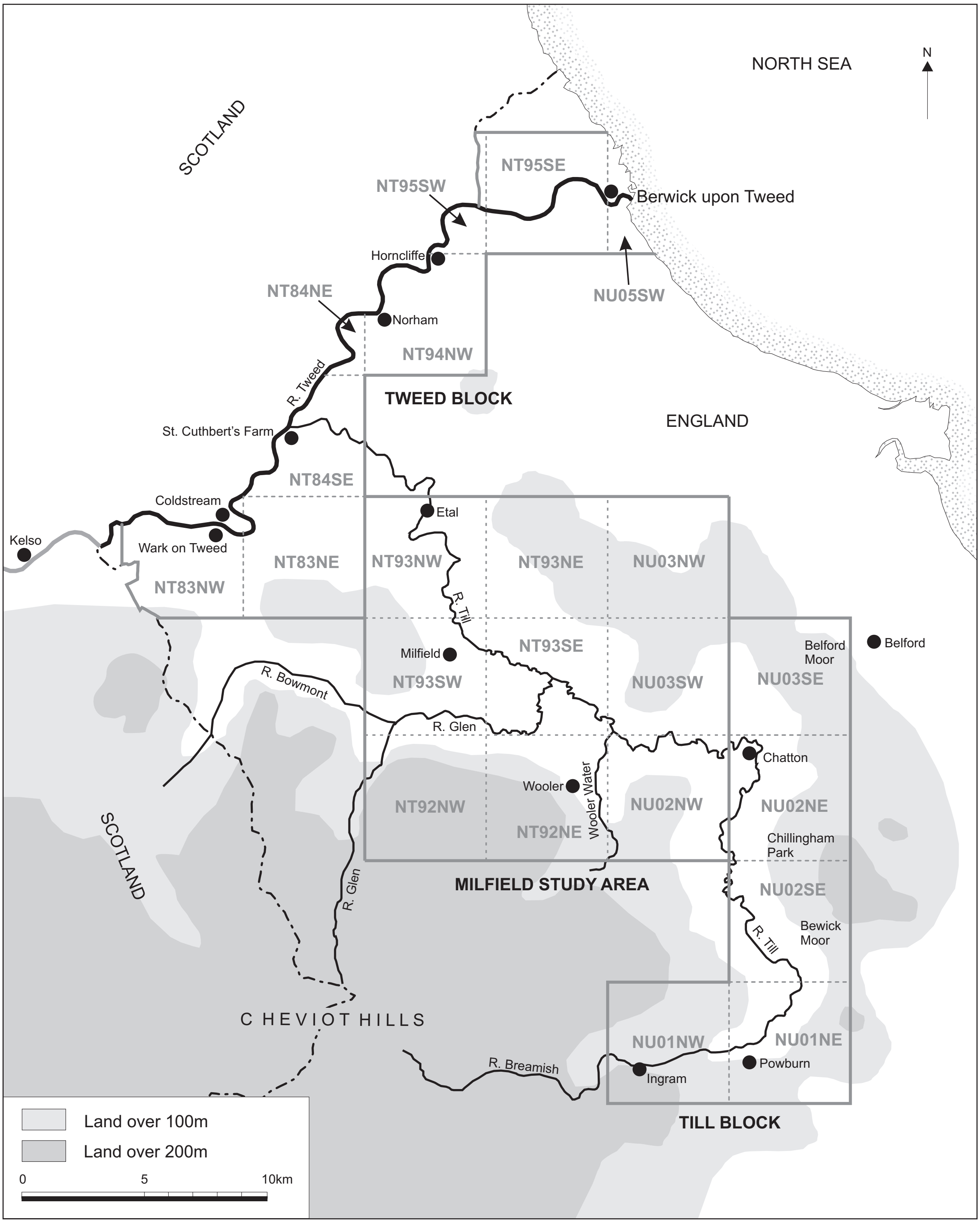


Fig. 1.2. The Till-Tweed study area.

sites considered to be of national and international importance. The valley floor areas of the Till and Tweed form the largest sand and gravel deposits in North-East England and it is these free-draining and fertile surfaces, situated above the floodplains of the rivers, that contain the bulk of the known archaeological sites (Waddington 1999; Passmore *et al.* 2002) and most of the scheduled monuments.

At the heart of the project is a landscape perspective that has focused on the characterisation of landforms and their archaeological associations. By using landforms to drive the fieldwork strategy (see below) and the mapping of archaeological remains, characterisation of the landscape takes place in relation to topographic features that have corresponding geological, soil, drainage and vegetation characteristics. This approach assumes that most human land use over the past 10,000 or so years is related to such features. Over the *longue durée* prior to the industrial revolution this is almost certainly the case, but it assumes a certain degree of environmental determinism as it is predicated on the view that human use of landscape is to some extent a response to landscape configuration. Nevertheless, this approach allows a consistent framework to be developed that can characterise large areas over long time spans. It also recognises, and allows for, variation in the distribution of soil types, drainage, vegetation, raw materials and land suitable for settlement or other uses. While it is acknowledged that social, political and economic considerations will have exerted important influences on past patterns of human settlement and land use, this approach considers the landscape itself, comprising the landforms, soils and vegetation cover, to form the basis for understanding the geographic context of human behaviour through time. Linking the past use of the physical landscape into the social, political, economic and ideological arenas of human behaviour provides an avenue into understanding past human groups, particularly in relation to observations based on geographical patterning of the data and increasingly accurate chronological control.

An important outcome of this approach is that characterising the landscape in this way allows modern landscape management, planning and development to be explicitly assessed according to their impact on different landforms. With each landform category having associations with particular types of archaeological and palaeoenvironmental sites, conditions of preservation and sensitivity to different evaluation techniques, the potential impacts on the archaeological and palaeoenvironmental resource can be gauged and appropriate evaluation and mitigation measures employed (see Chapters 6 and 7).

PROJECT BACKGROUND

Currently the sand and gravel deposits of the Till-Tweed catchment are subject to large-scale gravel extraction (e.g. Cheviot Quarry, Lanton Quarry, Hedgeley Quarry, Brandon Quarry and Wooperton Quarry) and there are applications in hand for new quarries at a number of sites including Brandon West, Hedgeley Haugh, Mains Hill and Marleyknowe (Northumberland Minerals Local Plan; Draft 1996). Ongoing, planned and potential aggregate extraction in the Till-Tweed catchment presents, therefore, a potential threat to the archaeological and palaeoenvironmental record developed on, and potentially buried within and beneath, catchment sand and gravel deposits. This threat is particularly acute in the Hedgeley Basin and Milfield Basin, where glaciofluvial and fluvial gravel terraces constitute the single most important landform type in the North-East region for archaeological remains, including the nationally important sites of Yeavering, Maelmin, and the Milfield henge complex. However, with the exception of work conducted in the Milfield Basin (Passmore *et al*. 2002), the landform, sediment and archaeological associations in catchment valley floors were until now poorly understood.

There has therefore been a pressing need to assess the nature and extent of the archaeological and palaeoenvironmental resource across these areas and to provide a management framework for inclusion in the Local Development Framework which can then be used by archaeological curators, planning officers, developers and the Northumberland Sites and Monuments Record, hereafter referred to as the Historic Environment Record or HER. Furthermore, the wealth of archaeological and palaeoenvironmental information from the sand and gravel deposits of the study area has seldom been made widely accessible to the general public. This is because much previous research work has remained confined to academic publications (e.g. Yeavering, the Milfield henges, Thirlings *etc*.), and there has been little attempt to coordinate and disseminate research findings to the wider non-academic community. Accordingly, a further component of this study has been the production of a series of popular books (e.g. Waddington and Passmore 2004) and the enhancement of interpretation facilities and the visitor experience at the Maelmin Heritage Trail in Milfield village (Waddington 2004a; www.maelmin.org.uk). This important strand of work lies beyond the scope of this volume but aspects of the wider outreach activity have been covered in other publications and reports (e.g. Waddington 2004a; Johnson and Waddington in press).

AIMS AND OBJECTIVES OF THE PROJECT

The broad aims of the project were supported by a suite of objectives that were refined and developed as the project evolved over several years. Although ambitious in the first instance, the emergence of early project outcomes and the availability of further resources led to an expansion of the geographical scope of the project as well as an enhancement of the management guidance provision.

Aims

1. Establish the spatial extent and character of landscapes associated with glaciation and deglaciation (including ice-contact meltwater deposits) and glaciofluvial sand and gravel terraces on the valley floor of the Till-Tweed study area.

2. Establish the spatial extent, character and, where possible, the chronology of Holocene landforms and sedimentary sequences within the study area.
3. Identify and evaluate the extent and preservation of deposits of palaeoenvironmental and archaeological value developed on glacial and post-glacial landscapes within the study area.
4. Enhance the understanding of past human land use and settlement in the study area through analysis of aerial photographs and a programme of archaeological fieldwalking, limited excavation and test pitting.
5. Develop an archaeological evaluation and management guidance framework for the Till-Tweed study area.

Specific Objectives

1. Undertake geomorphological mapping and (where possible) dating of Late Pleistocene and Holocene landforms throughout the study area. This was intended to differentiate valley floor landscapes into spatially delimited 'landform elements' that share similar geomorphic and topographic characteristics (*cf*. Passmore *et al*. 2002). Experience in the Milfield Basin and elsewhere in northern England (Passmore *et al*. 2002; Passmore and Macklin 1997) suggested that valley floor landform and sediment assemblages were most likely to be classified on the basis of their mode of formation as ice-contact meltwater deposits and glaciodeltaic, glaciofluvial or Holocene fluvial terraces. Smaller features associated with these landform elements, where evident as enclosed or channelled depressions (e.g. palaeochannels and kettle holes), were also differentiated, given their potential to act as foci for organic-rich sediment over Holocene timescales.
2. Assess organic-rich sedimentary sequences identified during the project for their potential to yield radiocarbon dates and palaeoecological records of vegetation and land use changes.
3. Conduct a high-resolution archaeological survey (using a combination of aerial photograph transcription and fieldwalking) of lithic scatters and monuments across landform elements identified by Objective 1. This was intended to extend the knowledge base gained from previous archaeological work in the Milfield Basin into hitherto unsurveyed areas, and thereby augment research priorities set out in the North-East Regional Research Framework (Petts and Gerrard 2006). It also responded to needs identified in national research frameworks such as 'Exploring Our Past' (3rd Draft, http://www.english-heritage.org.uk/upload/pdf/bericht4.pdf).
4. Assess the extent of past human activity across Till-Tweed landscapes through time in order to allow predictive modelling of the potential range and character of archaeological and palaeoenvironmental deposits liable to be encountered prior to new aggregate extraction proposals. This combined a range of approaches including fieldwalking, ground surface inspection, analysis of aerial photographs, sediment coring and dating.
5. Integrate geomorphological, palaeoenvironmental and archaeological data within a spatially-delimited, GIS-implemented resource management framework. This is intended to inform curators as to the most sensitive landscapes with respect to both the archaeological and palaeoenvironmental record in the Till-Tweed study area. It is anticipated that this will provide curators with a robust and effective tool with which to assess and manage the impact of developments, especially future aggregate extraction.

APPLICATION OF THIS STUDY

The Milfield Basin and Till-Tweed Geoarchaeology Projects have dovetailed into a conceptually and geographically continuous study (Waddington and Passmore 1999; Passmore *et al*. 2002; 2006) that provides a basis for synthesising regional landscape histories spanning the prehistoric to early medieval periods. The Milfield project was specifically focused on the Milfield Basin where the Rivers Till and Glen meet, however, when an opportunity to expand the project arrived the study area was extended both upstream and downstream to include the upper reaches of the Till and the lower reaches of the Tweed. Full integration of the historical research elements of these projects will be presented as an analytical synthesis in a companion volume (Passmore and Waddington in prep). On a wider scale, and in a similar vein, this study meshes with other geoarchaeological projects geared to understanding the archaeological and palaeoenvironmental associations of river valleys such as the Vale of York Project (Whyman and Howard 2005), the Swale-Ure Washlands Project (Long *et al*. 2004) and the Trent Valley Project (Knight and Howard 2004).

River valley sand and gravel terraces form one of the most attractive locations for human settlement throughout history and these areas of the British Isles are home to most of the high-density concentrations of cropmarks and archaeological remains. However, sand and gravel deposits are also a finite and irreplaceable resource that underpins the economy by sustaining the development of infrastructure, buildings and many other aggregate-derived products; for example, the construction of a typical British house requires 60 tonnes of aggregate. Since there are no alternative sources to this material other than recycled aggregates, whose use is already maximised, the conservation of remains in archaeologically sensitive landscapes has to be weighed against society's need for minerals and the provision of a managed and sustainable mineral supply. As a consequence there is a clear need for a management and conservation regime that balances the needs of both the historic and natural environment with those of aggregate extraction and other forms of land use (see Chapters 6 and 7). This study has sought to develop a high-quality mapped dataset that provides information with which to guide assessment and management

Fig. 1.3. Geomorphological recording at Hedgeley Quarry with artificial ponds occupying an earlier extraction area behind.

of much of the aggregate resource of North-East England. It provides explicit mapping of the landforms across the Till-Tweed catchment and links them to known archaeological associations and corresponding assessment and evaluation techniques. Furthermore, the ability of the approach to predict the archaeological and palaeoenvironmental potential specific to mapped landforms allows for forward planning and targeting of future aggregate extraction, and indeed other development, as part of the Local Development Framework. This approach is therefore pre-emptive rather than reactive, and hence should serve to reduce impacts on the historic environment as well as reduce costs, complications and delays for developers and the local authority. Furthermore, by helping to minimise future planning applications in areas with known or potential archaeology, risk can also be managed more effectively by all stakeholders.

Landscape planning is concerned with finding optimal and balanced solutions to demands that are frequently in competition, and this is particularly true with respect to management of the historic and natural environment. Indeed, addressing one environmental need may cause another environmental problem. For example, if the location of a proposed quarry was moved in one direction because of concerns for the great crested newt or another endangered species this may cause greater impacts on archaeological remains surviving in the alternative area. Such situations are increasingly commonplace with the demands of different environmental concerns sometimes in conflict. The challenge today is to create explicit landscape-specific guidance based on informed studies that take account of competing environmental concerns. Bearing this in mind, this study has incorporated both archaeological and palaeoenvironmental data into the same GIS mapping to provide a single source for identifying known deposits of historic interest. This GIS resource has been deposited with the Northumberland Historical Environment Record as well as with the Archaeological Data Service and has been distributed to developers and consultants. It is freely available on request from Northumberland County Council and includes a downloadable manual. The GIS resource requires use of the ArcView or ArcMap programmes but cannot be supplied with Ordnance Survey basemaps due to copyright, but the GIS resource is designed to sit on top of Ordnance Survey digital map data, which can be purchased online. For mapped data showing the location of all statutorily protected sites and areas and their designations, the reader is advised to consult the government's online mapping site www.magic.gov.uk. A summary publication, 'Planning for the Future' (Waddington and Passmore 2006), has been published, which forms a user guide for the Till-Tweed GIS resource and the implementation of the landform element approach. This document has been used as the basis for a minerals and archaeology national practice guide that has been developed by the Minerals and Historic Environment Forum (Waddington 2008).

ENVIRONMENTAL BACKGROUND

The Till and the lower Tweed are gravel bed rivers that drain the eastern parts of the Southern Uplands of Scotland and the rounded upland domes of the southern and south-east Cheviot Hills, which reach a maximum elevation of 815m OD. Lower reaches of the Tweed valley traverse gently undulating relief between 30 and 200m OD, and here the present river Tweed constitutes the Anglo-Scottish border. The Tweed is joined by the Till at Tweedmill, 4km downstream of Coldstream (Fig. 1.2). With a catchment area of 650km^2, the Till is the second largest tributary of the Tweed and flows north through a valley underlain by Carboniferous Cementstones. The western flanks of the Till are defined by the Cheviot massif, a complex of Devonian volcanic rocks predominantly comprising ashes, pyroclasts and andesitic lavas and a later Devonian granite intrusion. To the east of the Till the landscape is dominated by a pair of gently curving escarpments with west-facing craggy ridges formed by Carboniferous Fell Sandstones. The catchments of the Tweed and Till are predominantly rural and modern land use above 300m is characterised by moorland, conifer plantations and rough pasture. Lower valley sides and valley floors are dominated by gently undulating relief that supports arable cultivation and improved pasture. Soil cover in the region includes well-drained brown earths in many of the lowland settings, with gleys and stagnogleys on intermediate slopes and podzols and peats developed in upland locations (Payton 1980).

The physical landscape of the Cheviot-lower Tweed region was extensively modified by glaciers and meltwater associated with the advance and retreat of Late Devensian ice sheets (Douglas 1991; Lunn 2004). During the Last Glacial Maximum, most of the Cheviot-lower Tweed area was overrun by ice flows originating from the Southern Uplands and Solway Firth to the west, and much of the area is mantled with a variable thickness of till. Deglaciation has left extensive areas of glaciofluvial sand and gravel in the valley floors and these now form the terraces that have been the focus for much prehistoric and historic human activity. Post-glacial landform development has been focused on the river corridors flanked by these terraces, and here valley floors are infilled with Holocene alluvial sediments. Published palaeoenvironmental research has focused in particular on the Milfield Basin, a physically distinct area of low-lying (below 70m OD) Late Devensian glacial drift and Holocene alluvial deposits extending over 15km^2 in north Northumberland. Investigations of drift geology and basin soils have demonstrated the valley floor to be infilled with thick deposits of Late Pleistocene tills, glaciolacustrine silts and clays, and stratified glaciofluvial and glaciodeltaic sands and gravels (Clapperton 1970; 1971a and b; Payton 1980; 1992; Tipping 1994a; 1998). Fluvial incision sometime during the later stages of deglaciation has left these deposits as upstanding terraces, and subsequent Holocene alluviation has infilled large areas of the valley floor.

Analysis of Holocene pollen records from regional bog and mire deposits has demonstrated evidence for prehistoric and historic woodland clearance and agricultural activity in upland areas peripheral to the basin (e.g. Davies and Turner 1979; Simmons and Innes 1987; Innes and Shennan 1991; Tipping 1992; 1996). Valley floor localities have also yielded pollen records of Late Pleistocene and Holocene environments in the study area. These are primarily alluvial peat deposits that are documented in the Breamish valley near Powburn (Tipping 1992; 1996), the Milfield Basin at Akeld Steads (Borek 1975; Tipping 1998) and the Wooler Water, a tributary of the Till (Clapperton *et al*. 1971; Tipping 1992). Pollen evidence at these sites reveals the impact of late prehistoric woodland clearance both on and near the floodplain. An earlier record of environmental change has also been recovered from sediments infilling a Late Pleistocene kettle hole in a sand and gravel terrace at Lilburn South Steads near Chatton (Jones *et al*. 2000). This site records the Late Glacial to Holocene transition which saw tundra-like vegetation replaced by birch- and then hazel-dominated woodland.

In combination these previous investigations provide an important but limited context for our understanding of environmental change in the region, while simultaneously indicating the value of establishing linkages between different types of landforms and different types of archaeological sites that will inform the development of archaeological research and historic environment management frameworks.

ARCHAEOLOGICAL BACKGROUND

While most early archaeological work has tended to be focused on individual sites (e.g. Hope-Taylor 1977; Harding 1981; Miket 1981; 1985; O'Brien and Miket 1991), the true significance of the study area lies in it being a multi-period archaeological landscape. In recent years a landscape approach has been adopted to understand wider patterns of land-use and settlement in north Northumberland and to understand sites in their wider context (see Waddington 1999).

It is notable that there has been very little previous archaeological work in the lower Tweed valley or the reaches of the Till between the Milfield Basin and the Breamish valley. The few notable exceptions to this are the excavation of the late prehistoric settlement complex at Murton High Crags (Jobey and Jobey 1987) and the excavation of the first *Grubenhäuser* site in northern England at New Bewick in the Till valley

(Gates and O'Brien 1988). Since then there has been a commercially funded excavation of part of a crop-marked palisaded site at the North Road Industrial Estate on the north side of the Tweed at Berwick (Pre-construct Archaeology Limited 2005) and there has been work on the medieval remains within Berwick itself (Northumberland HER). However, inspection of aerial photographs shows that there is a vast number of crop- and soilmark sites (see Chapter 4) situated on the valley floor landforms throughout the study area, together with a complex suite of post-glacial and Holocene palaeoenvironmental deposits. There has been no previous systematic attempt to catalogue and identify these buried sites. In addition some upstanding archaeological sites are also noted on these terraces, such as the remnants of an earthwork enclosure to the south of Milne Garden on the Tweed or the earthwork enclosure east of West Ord (also on the Tweed). However, as no previous work has been undertaken to map and characterise the archaeology of this area, many of these sites have remained hitherto nameless and absent from the HER. This study is therefore concerned with establishing what archaeological and palaeoenvironmental deposits survive in this area, the creation of systematic records as well as analytical research and landscape conservation.

Additional archaeological work undertaken includes the small-scale excavations at The Hirsel, near Coldstream in the Tweed valley by Cramp (1980). This site was of significance as it revealed Early Neolithic deposits below the early medieval remains, mirroring the situation found at nearby Till valley sites such as Thirlings (Miket 1987; O'Brien and Miket 1991), Yeavering (Hope-Taylor 1977; Harding 1981), Cheviot Quarry North (Johnson and Waddington in press) and Lanton Quarry (Waddington and Johnson in press). Most recently, however, testing for the presence of an Iron Age fort at the site of Norham Castle was undertaken as a supplementary part of this study, although radiocarbon dating of material from the base of the bank dump indicated a post-medieval date for this feature (Brightman and Waddington 2005).

Collection of flints from field surfaces has taken place in the Tweed valley further upstream from this study area during the course of the 20th century. For example an important collection of Mesolithic stone tools was recorded at Dryburgh Mains where, Lacaille tells us (1954, 162), "They are composed chiefly of artefacts turned up by the plough in 12 inches of sandy clay resting upon gravel on the fertile haughlands, about 20 feet above the river". Other important clusters of flint denoting predominantly Mesolithic, but also Neolithic and Bronze Age activity, have been found on the sand and gravel terraces along the Tweed corridor. According to Lacaille (1954, 162–3): "As a rule, the relics have been found on the low ground near the rivers".

It has been clear for some years that the gravel terraces of the Till-Tweed catchment contain abundant archaeological remains dating from the earlier Holocene through to the medieval period and later. The types of archaeology reported from these areas range from Mesolithic flints, Neolithic flints, stone axe heads and monuments, Bronze Age barrows and ring ditches, and Iron Age forts on gravel bluffs to early medieval settlements and medieval castles. This previous work demonstrates that the study area contains an immense archaeological resource but very little was known outside the scope of the small site-based studies, and even less about site chronology in the area. The results from this study show that the resource is in fact both larger and more significant than originally thought.

METHODS

In order to address the aims and objectives of this study the fieldwork was oriented around four major fieldwork elements: geomorphological mapping and palaeoenvironmental sampling, aerial photograph transcription, fieldwalking and test pitting, and archaeological evaluation excavations. The geomorphological mapping has produced a high-resolution map of the study area based on an analysis of geological and topographic maps, remote sensing data (LiDAR), aerial photograph assessment and a fieldwork programme (see Chapter 2). Selected sedimentary sequences with good preservation of organic materials (including peat) have been radiocarbon-dated and assessed for their palaeoecological potential (Chapter 2). The aerial photography work (see Chapter 4) was undertaken to the same standards as English Heritage's 'National Mapping Programme', resulting in the enhancement of records for 218 sites and new records for 254 sites (representing a 117% increase in the number of recorded sites). The fieldwalking extended over an area of 964.3 ha at the 40% sampling interval (5m spacing), and in the case of two fields at 100% (2m spacing). A total of 3340 Stone Age artefacts was recovered, together with an additional 197 from test pits, and later material including 30 fragments of pottery, one coin and one button. Together these datasets provide detailed information that has been assembled into a single geographical information system (GIS) resource. By storing this data electronically the information can be quickly accessed and shared between many users, ranging from researchers and students to the planning authority, HER, landscape planners and developers. This geographically integrated resource provides evidence-based information for the long-term conservation of this landscape as well as the analysis of data for research purposes: the latter forms a key part of the landscape synthesis that is being published as a companion volume to this (Passmore and Waddington in prep).

RADIOCARBON CONVENTIONS

All dates expressed in the text of this volume are given in calibrated years BC and AD (i.e. calendrical dates). Although this is conventional for later prehistory it has not, in the past, been the custom for earth science studies or those archaeological studies geared to the Early Holocene. As the calibration curve now extends to the end of the last Ice Age it is now becoming the accepted convention to quote all Holocene dates in calendrical years which allows dates from environmental sediments and archaeological sites to be correlated more easily. This produces a noticeably more fluent structure for ordering and comprehending the dates linking earlier prehistoric time in particular into a consistent chronological continuum.

2 Past and Present Landscapes in the Till-Tweed Region

David G. Passmore and Tim van der Schriek

with contributions from Alex Bayliss, Jacqueline Cotton, Basil Davis, Steve Houghton, Eniko Magyari, John Meadows, Emma Tetlow, David Smith and Clive Waddington

INTRODUCTION: GEOARCHAEOLOGICAL CONTEXT OF THE PROJECT

Geoarchaeological strategies for the evaluation and management of archaeological records in UK river valley environments have attracted considerable attention over the past two decades (e.g. Needham and Macklin 1992; Passmore and Macklin 1997; Brown 1997; Howard and Macklin 1999; French 2002; Passmore *et al*. 2002; Howard *et al*. 2003). In combination with the long record of collaboration between earth scientists and archaeologists elsewhere in Europe (e.g. Howard *et al*. 2003), the Mediterranean (e.g. Lewin *et al*. 1995) and North America (e.g. Waters 1992; 2000; Bettis *et al*. 2002), this work has established that river valleys present a particular set of challenges to heritage managers. In particular, it is widely recognised that the long-term geomorphological operation of river and slope processes has the potential not only to displace and/or erode archaeological features and artefacts, but also to bury and preserve intact archaeological landscapes beneath protective covers of alluvium and colluvium. The archaeological resource in these contexts may be rendered undetectable using conventional survey or prospection techniques; however, where located, buried sites and landscapes that have remained waterlogged may yield exceptionally well preserved archaeology (e.g. Clark 1972; Pryor *et al*. 1985; 1986; Coles and Coles 1986; 1996).

The contribution of geoarchaeological perspectives on river valley evolution is not limited solely to prospection for the material archaeological record; it is perhaps equally well understood that landforms and their associated sedimentary records constitute an archive of environmental change that can help to locate past human activity in its contemporary landscape and environmental context (e.g. Brown 1997; French 2002). Furthermore, many studies have drawn attention to the utility of sedimentary records for yielding 'off-site' records of human activity through analysis of, for example, palaeoecology (e.g. Scaife and Burrin 1992; Tipping 1992; Brown 1997), sediment geochemistry (e.g. Passmore and Macklin 1994; Hudson-Edwards *et al*. 1999) and the patterns and chronology of valley floor development (e.g. Pryor *et al*. 1985; Needham and Macklin 1992; Macklin *et al*. 1992; 2003; Passmore and Macklin 1997). Indeed, in places where the archaeological record is poorly preserved or absent, these records may present the only means of elucidating the presence and nature of past human activity.

From a heritage management perspective there is, therefore, a clear value in establishing some form of zoning of the landscape that can be linked to the documented *and* potential archaeological and palaeoenvironmental resource (e.g. Howard and Macklin 1999; Passmore *et al*. 2002), and which in turn can provide the framework for appropriate evaluation and mitigation strategies. At this point the role of geomorphological assessment becomes central to Cultural Resource Management (*cf*. Green and Doershuk 1998), and this provides the basis for the geoarchaeological component of the Till-Tweed study. Here we have adopted the methodological approach of 'landform element' modelling that has been developed by the authors in the neighbouring Milfield Basin study (Passmore *et al*. 2002). This methodology is similar to the 'temporal surface' (Gardner and Donahue 1985) and 'landscape element' (Stafford and Hajic 1992; Stafford 1995) concepts employed by geoarchaeologists in North America. Landscape elements have been defined as "minimal spatial units with homogeneous geomorphic and topographic characteristics" (Stafford and Hajic 1992, 140) and may be defined on a variety of spatial scales. In river valley environments, for example, these may include discrete floodplain units and abandoned river channels (palaeochannels) or, on the scale of the valley floor, entire river terraces. By accounting for the landforming processes associated with specific landforms, these concepts address the potential of landscapes and their associated archaeology to experience modification, burial and/or transformation over time. For example, data encompassing the age, thickness and depositional environment of landscape elements have been used to define 'landform-sediment assemblages' (Bettis 1992; Stafford and Hajic 1992) that have been used to predict the potential age range and context of archaeology lying on or beneath modern landsurfaces.

Systematic geomorphological mapping is becoming a routine element of CRM programmes in North America (Green and Doershuk 1998), and has extended to large-scale regional analyses that include a 500km reach of the Mississippi River Valley (Bettis *et al*. 1996). The pressing need for geographically informed CRM frameworks in the UK has long been recognised by English Heritage (e.g. Olivier 1996; English Heritage 1997); yet, and despite the record of geoarchaeological research in valley floor contexts, examples of geomorphically driven approaches are relatively few and tend to be confined to limited reaches of the Holocene valley floor (see, for example, Pryor *et al*. 1985; French and Wait 1988; Dinn and Roseff 1992; French *et al*. 1992; Hayes and Lane 1992; Lane 1993; Allen *et al*. 1997; Howard and Macklin 1999; Howard *et al*. 2003).

The Till-Tweed study builds on the landform element approach developed for Lateglacial and Holocene valley floor environments in the Milfield Basin, Northumberland (Passmore *et al*. 2002; 2006; Fig. 2.1). Geoarchaeological work in the Till-Tweed project has also prioritised the valley floor environment since it is here that concentrations of prehistoric and early historic monuments lie on extensive sand and gravel deposits, often in close proximity to aggregate quarries. However, geoarchaeological mapping has also extended the scope of investigation to the surrounding valley sides and hilltops (Fig. 2.1). In total this work has encompassed nearly 560km^2 of the Till-Tweed landscape with the aim of developing management guidelines that will enable archaeologists and heritage managers to assess the cultural resource potential of Till-Tweed landscapes in a more robust manner than has hitherto been possible. In this chapter we describe the methods and results of the geomorphological and palaeoecological component of the project.

Structure of the chapter

The chapter begins with an overview of the physiology, geology and Quaternary history of the Cheviot-lower Tweed region and includes a review of published Holocene environmental records. The following section describes the geomorphological, geochronological and palaeoecological methods employed by the project, and sets out the full landform element classification system developed for the Till-Tweed landscape. The description and analysis of landform-sediment assemblages and their palaeoecological records is organised in the context of three contiguous study blocks, respectively encompassing the study reaches of the River Breamish/Till (Till Study Block), Milfield Basin (Milfield Basin Study Block) and lower reaches of the Till and the lower Tweed (Tweed Study Block). In the final part of the chapter we present an overview of Holocene environmental change in the study area. A full analysis of landform, sediment and archaeological associations is developed in Chapter 6.

PHYSIOLOGY, GEOLOGY AND QUATERNARY HISTORY OF THE CHEVIOT-LOWER TWEED REGION

The gravel bed River Tweed drains the eastern parts of the Southern Uplands of Scotland and parts of the Cheviot Hills in Northumberland. It is the second largest river basin in Scotland with a catchment area of 4390km^2 measured at Norham, 4km upstream of the tidal limit at Horncliffe (Fig. 2.1). The Tweed basin is predominantly rural and over 50% of the basin lies above 300m. Lower reaches of the Tweed valley traverse gently undulating relief between 30–200m and here the present River Tweed constitutes the Anglo-Scottish border. The study block of the Tweed comprises nearly 138km^2 of the lower reaches of the river, extending between Coldstream and the A1 road crossing 5km upstream of the river mouth at Berwick (Fig. 2.1). Within this reach the River Tweed has a gently meandering gravel-bed channel with a sandy floodplain and several vegetated mid-channel islands (Fig. 2.2). The valley floor is characterised by alluvial basins up to 1.5km wide at Coldstream, Ladykirk House, Norham (the tidal limit), Horncliffe and below Gainslaw House that are connected by narrow, drift and bedrock-confined reaches with little alluvial storage.

The gravel bed River Till is the second largest tributary of the Tweed with a catchment area of 650km^2 and joins the Tweed at Tweedmill, 4km downstream of Coldstream and 20km above the mouth of the river at Berwick (Fig. 2.1). Upper reaches of the Till (called the Breamish above Bewick Mill, Fig. 2.1) drain the rounded upland domes of the southern and south-east Cheviot Hills which reach a maximum elevation of 815m. Towards the margins of the upland massif the Breamish occupies a narrow and steep-sided valley with laterally active and occasionally divided channels. The Breamish leaves its upland valley at Ingram where it emerges into a relatively wide valley floor that is characterised by extensive terraced sand and gravel. Here the Breamish has a laterally active gravel bed channel that is frequently divided around

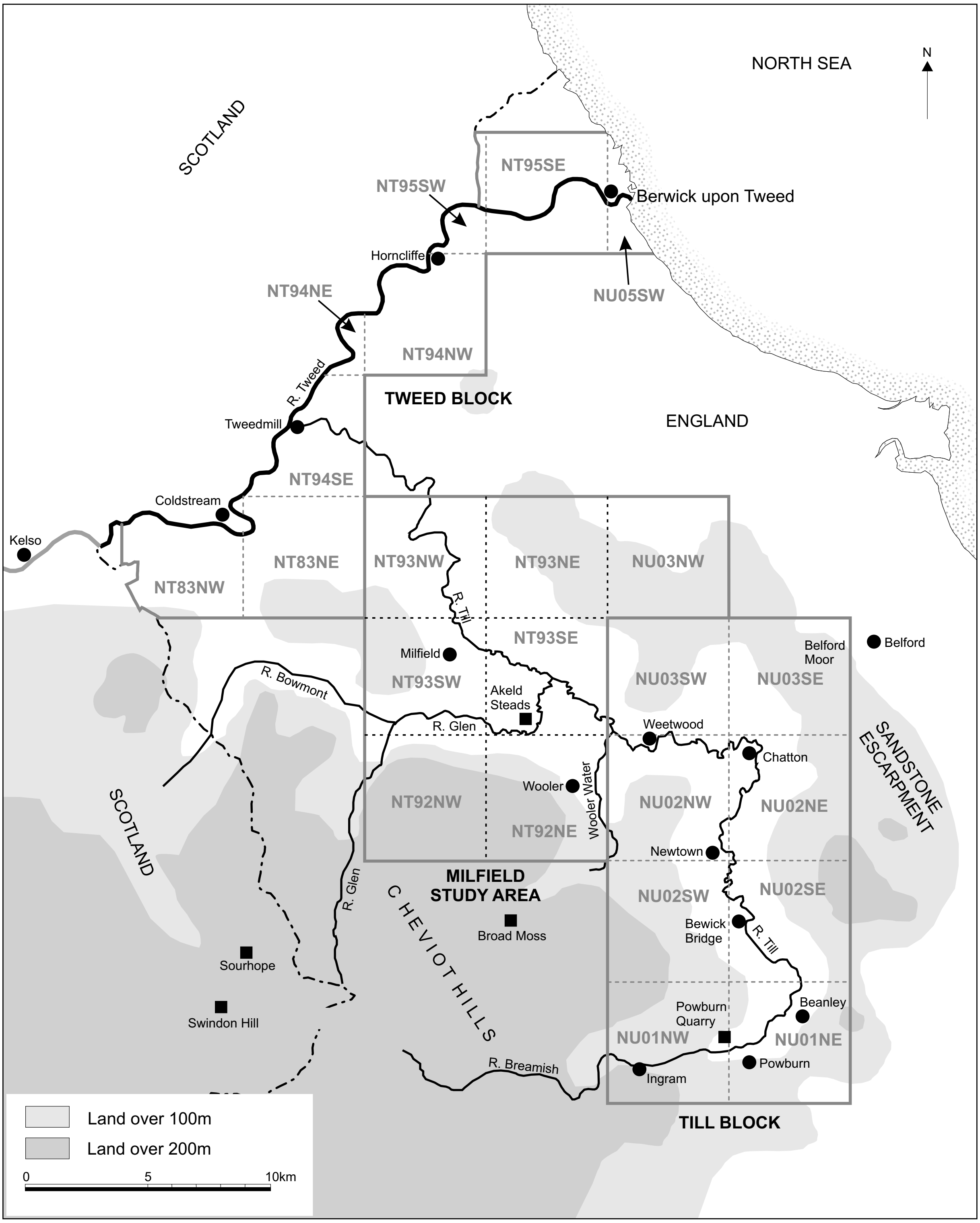


Fig. 2.1. Map of the River Till and Lower Tweed river basins showing relief, location of study blocks and sites mentioned in text.

low gravel bars and vegetated islands (Fig. 2.3). Between Powburn and Hedgeley, 3–5km downvalley of Ingram, the river channel, floodplain and adjacent sand and gravel terraces have been extensively modified by modern aggregate extraction that continues to the present day. Downstream of the quarry workings, the Breamish/Till meanders north and then east through an alluvial valley floor up to 1km in width that is flanked by gently undulating glacial and glaciofluvial drift and, to the east, the slopes of a Fell Sandstone escarpment that rise steeply to 315m OD (Fig. 2.1).

The River Till leaves its confined valley floor at Weetwood and enters the low-relief (below 70m OD)

Fig. 2.2. The River Tweed upstream of Horncliffe.

Fig. 2.3. The River Breamish (Till) between Powburn and Ingram.

Milfield Basin, the largest alluvial basin (*c*.15km^2) in North-East England. Here the Till meanders gently within prominent flood embankments across a broad expanse of alluvium between 34–36m OD (Fig. 2.4). In the central part of the basin the Till is joined by the tributary rivers Glen and Wooler Water which drain the northern flanks of the Cheviot Hills. Below the confluence with the Glen, and downvalley to Etal, the Till becomes again confined to a valley floor up to 1km wide that lies between upstanding Late Devensian terraces. Lower reaches of the Till, between Etal and Tweedmill, occupy a deeply entrenched bedrock gorge with little or no floodplain expanse.

The catchments of the rivers Tweed and Till are predominantly rural and modern land use is closely related to altitude, relief and the underlying geology. Over half of the basin lies above 300m OD and is characterised by moorland, conifer plantations and rough pasture. Lower reaches of the Tweed and Till, by contrast, are dominated by gently undulating relief that supports arable cultivation and improved pasture. The underlying pre-Quaternary geology of the lower Tweed and Till valleys is of Devonian and Carboniferous age (Fig. 2.5). The relatively low relief of the lower Tweed is dominated by a mixture of Devonian sandstone and Carboniferous limestone, while to the south the rounded domes of the Cheviot Hills are formed by a complex of Devonian volcanic rocks predominantly comprising ashes, pyroclasts and andesitic lavas and a later Devonian granite intrusion. To the east of the Cheviots the landscape is dominated by a pair of gently curving escarpments with west-facing craggy ridges formed by Carboniferous Fell Sandstones. Intervening broad vales are underlain by Carboniferous Cementstones. Soil cover in the region includes well-drained brown earths in many of the lowland settings, with gleys on intermediate slopes and podzols and peats developed in upland locations (Payton 1980).

Quaternary history

Northumberland has a record of glacial research that extends back to William Buckland's identification of large 'moraines' on the eastern flanks of the Cheviots in the mid-19th century (Boylan 1981). In the early part of the 20th century, work by Kendall and Muff (1901; 1903) demonstrated that the Cheviot Hills exhibited one of the most well-developed sequences of glaciofluvially eroded channels in England. Erosional and constructional features associated with glacial meltwater in eastern parts of the Cheviots and the Till valley have subsequently been documented by Carruthers *et al.* (1932), Common (1954), Derbyshire

Fig. 2.4. The River Till near Thirlings, Milfield Basin.

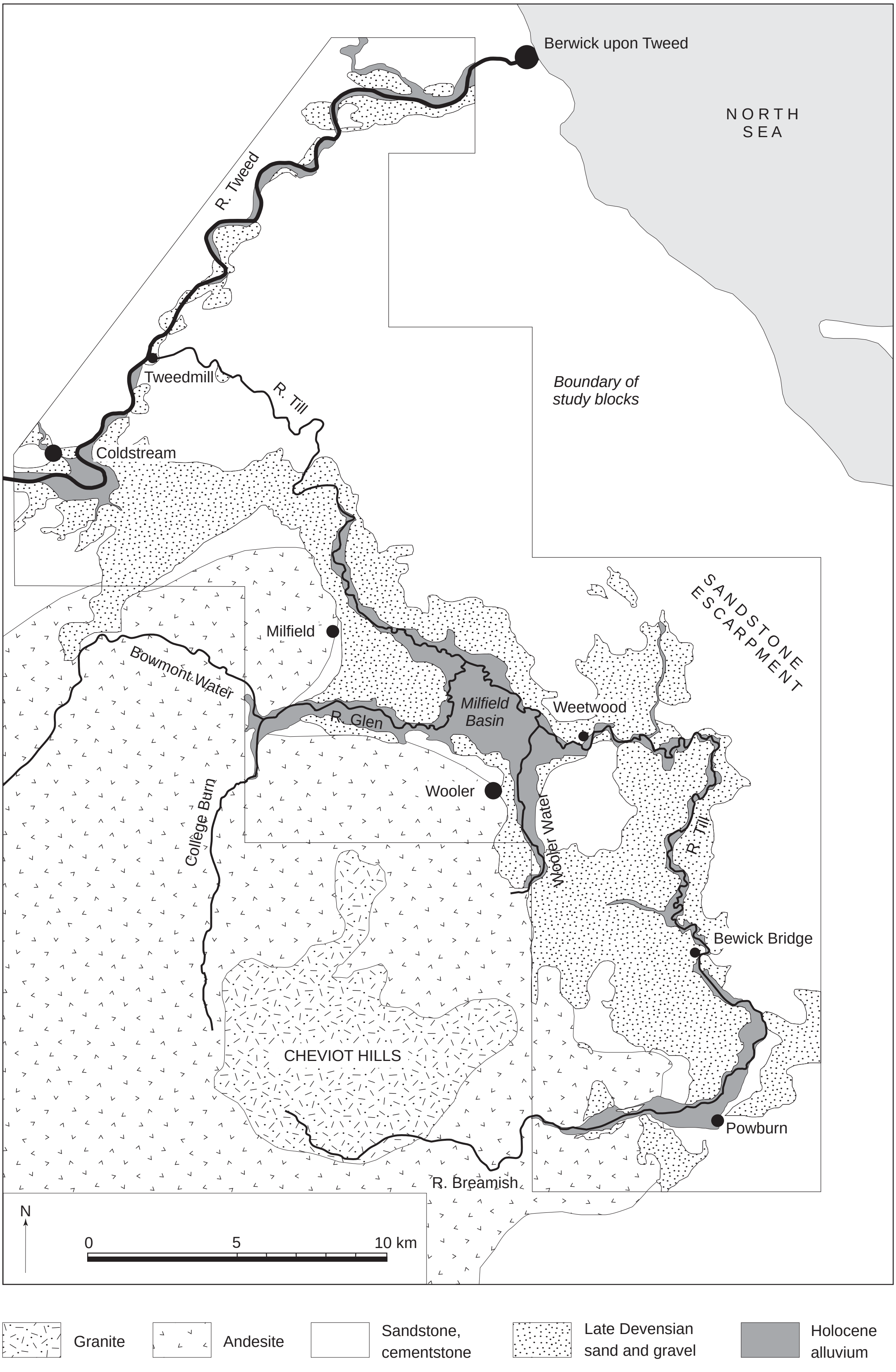


Fig. 2.5. Simplified pre-Quaternary geology and Quaternary deposits in the study area; areas of Late Devensian sand and gravel include ice-contact meltwater, glaciofluvial and glaciodeltaic deposits and are mapped in the study blocks only.

(1961) and Clapperton (1970; 1971a and b). More recent work by Douglas and Harrison (1985; 1987) and Harrison (1996; 2002) has focused on Late Devensian slope deposits in the Cheviot Hills, and Harrison *et al.* (2006) have described geomorphological and sedimentological evidence of former glaciation in the Bizzle valley on the northern flank of the Cheviot massif. In general, however, the stratigraphic framework for Quaternary landform and sediment assemblages in Northumberland is poorly developed (Douglas 1991), and several workers have noted the lack of published dates for either maximum glaciation, deglaciation or the later Loch Lomond (Younger Dryas) Stadial in the study area (e.g. Teasdale and Hughes 1999; Harrison 2002; Harrison *et al*. 2006).

In the absence of a secure chronological framework, investigations of regional Quaternary stratigraphies are reliant on morphostratigraphic analysis of landform-sediment assemblages, which are provisionally dated by analogy to independently dated sequences from other upland regions of the British Isles (Harrison 2002; Harrison *et al*. 2006). On this basis the record of glaciation and deglaciation in the Cheviot-lower Tweed area has been summarised in the context of regional reviews by Lunn (1980; 2004), Douglas (1991) and Teasdale and Hughes (1999). It is currently thought that North-East England has been overrun by Quaternary ice sheets on at least two occasions, although the evidence from early events is very limited. Surviving landform-sediment assemblages of glacial origin are generally regarded as belonging to the latter part of the most recent glacial cold stage, in Britain termed the Late Devensian. This spans the Last Glacial Maximum (the Dimlington Stadial), *c*.25,000–14,700 cal BC, the mild Windermere Interstadial (*c*.13,400–11,000 cal BC) and the brief cold episode of the Loch Lomond (Younger Dryas) Stadial, *c*.11,000–9600 cal BC.

The broad pattern of ice sheet flows over Northumbria was established by Raistrick (1931) and other workers in the early part of the 20th century, although the detailed pattern of ice sheet extent and interactions is still poorly understood (Douglas 1991). It is generally understood that during the Last Glacial Maximum, most of the Cheviot-lower Tweed area was overrun by ice flows originating from the Southern Uplands and Solway Firth to the west (Fig. 2.6). These flows were deflected southwards along the coast by the confluent Scandinavian ice sheet. On the basis of the distribution of Cheviot and non-Cheviot erratics, Clapperton (1970) has also argued that easterly flowing ice was deflected around the northern and southern margins of the Cheviot Hills by the presence of a local ice cap (Fig. 2.6). However, the nature and extent of the latter is uncertain (Lunn 2004) and Harrison *et al*. (2006) have argued for only a very restricted ice cover at this time. Clapperton's (1970) analysis also suggests that the Breamish valley was the point of confluence for ice masses converging around the northern and southern flanks of the Cheviots, and from the massif itself.

Late Devensian landform and sediment records in the Till and lower Tweed valleys therefore owe much to the character and configuration of these ice sheets and the pattern of deglaciation. This record may be usefully summarised in the context of three landscape types (after Douglas 1991):

1. **Glaciated upland landscapes**. A small cirque basin ('The Bizzle') has been described on the northern flanks of the Cheviots (Harrison *et al*. 2006), and the occurrence of small drumlins and drift tails is indicative of ice movement in some of the major Cheviot valleys, but in general the upland parts of the study area lack the well-developed Late Devensian erosional features and deposits that are characteristic of the Lake District. Southerly flowing ice to the east of the Cheviots may, however, have accentuated the ridge and vale topography of the Fell Sandstone escarpment, while Cheviot hillslopes have been strongly modified by a combination of paraglacial and periglacial processes (Harrison 2002; Harrison *et al*. 2006).
2. **Lowland till deposits**. In common with much of Northumberland, low-lying parts of the Cheviot-lower Tweed landscape are typically covered with a variable thickness of till between *c*.1 and 10m in thickness (Lunn 2004). In the valley of the lower Tweed, the till cover and other drift deposits have been moulded beneath the Dimlington Stadial ice to form a distinctive drumlinised landscape that strongly reflects the south-west to north-east ice flow direction (Fig. 2.6). Till also mantles the slopes of the Cheviots and Fell Sandstone escarpment flanking the Till valley to the south, although this cover is patchy above 100m OD and bedrock crags are exposed on higher parts of the escarpment.
3. **Landscapes associated with meltwater and glaciofluvial deposition**. The Cheviot-lower Tweed region features two extensive areas of glaciofluvial sand and gravel: a northerly deposit that stretches between Cornhill in the Tweed valley around the northern flank of the Cheviots (termed the Cornhill 'kettle moraine' by Sissons 1967), and to the south between Wooler and the Breamish valley at Powburn (Fig. 2.5). These characteristic hummocky landscapes comprise ice-contact and proglacial features including eskers, kames, kettle holes and terraced outwash associated with downwasting and retreating ice at the end of the Dimlington Stadial (Douglas 1991; Lunn 2004). Glaciolacustrine deposits are also locally present in the valley of the Breamish-Till. These deposits, together with extensive and complex systems of meltwater channels on the northern and eastern flanks of the Cheviot Hills, have been described in detail by Clapperton (1970; 1971a and b).

These elements of the Quaternary record will be discussed in detail below in the context of the specific study blocks identified in the Till-Tweed project.

Holocene environments

Considering its size and location, the alluvial history of the River Tweed has received surprisingly little

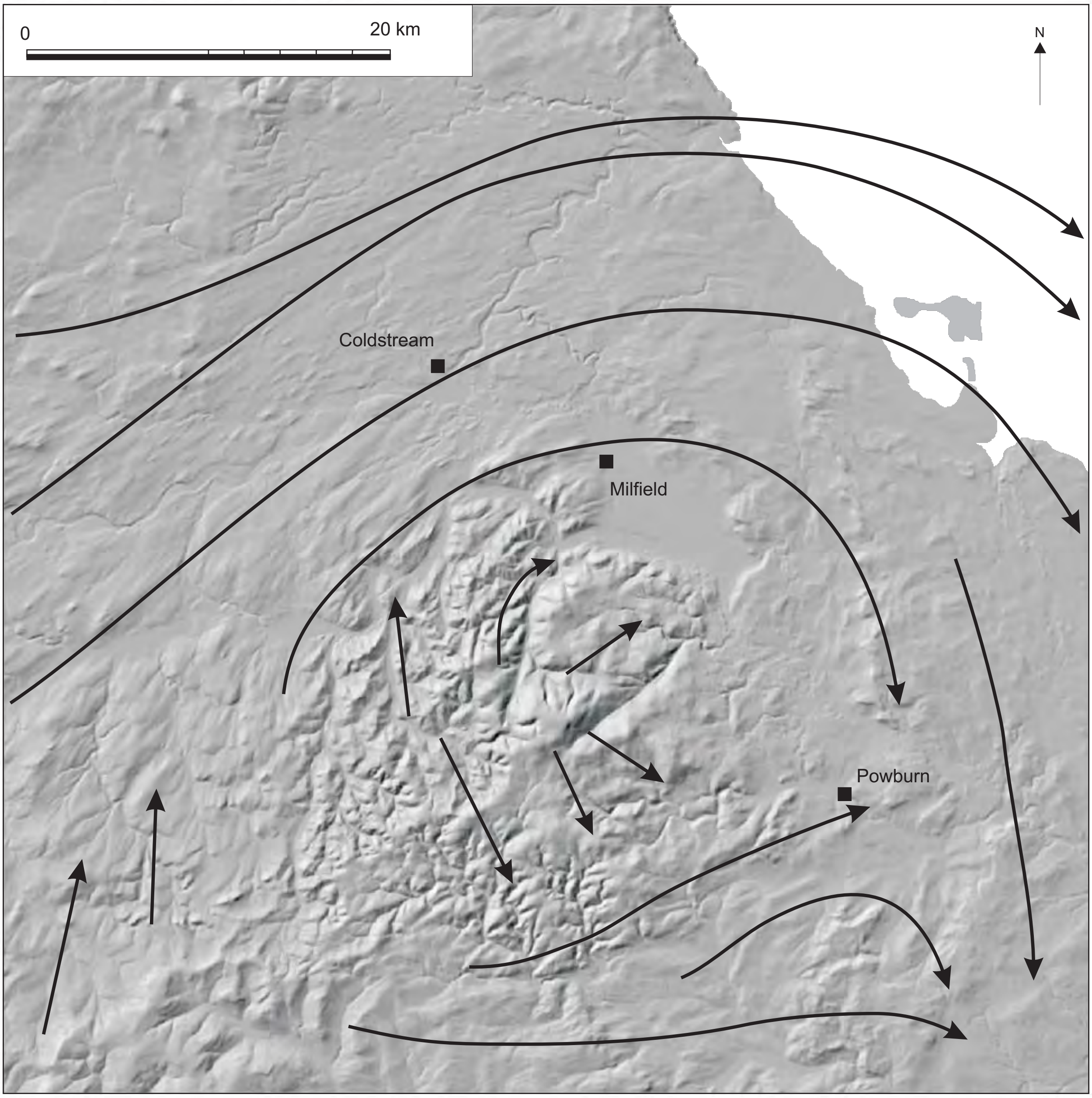


Fig. 2.6. Digital elevation model of the Cheviot-Lower Tweed region showing ice sheet flow lines (after Lunn, 2004).

attention by geomorphologists. Recent work by Owens and Walling (2002) has elucidated overbank floodplain sedimentation rates for the past 100 years, but with the exception of a site in the upper Tweed valley at Hopecarton (Tipping and Halliday 1994), there are no published radiocarbon dates for Holocene alluvial sequences in the trunk valley. However, preliminary investigations at Coldstream by Passmore and Macklin (unpublished data) have identified Late Devensian and Holocene fluvial terraces, and some unpublished ^{14}C dates are available for this site. By contrast, dated Holocene fluvial records in the basin of the River Breamish/Till have been reported from sites in the Breamish valley at Brandon Quarry (Tipping, 1992; 1994a), the River Till in the Milfield Basin (Tipping 1994a; 1996; 1998; Passmore *et al*. 2002) and the tributary valley of the Wooler Water near Wooler (Clapperton *et al*. 1971). Results from these investigations will be described below in the context of new data collected by this project.

Upland bog and mire deposits in the Cheviot Hills have attracted a number of published pollen-based palaeoenvironmental investigations that provide a record of Holocene vegetation histories in the Cheviot upland region. Sites in the Cheviots (and hence relatively close to the study area) include Yetholm Loch, Sourhope and Swindon Hill (Tipping 1992), Din Moss (Hibbert and Switsur 1976) and Broad Moss (Davies and Turner 1979) (Fig. 2.1). These sites record early phases of forest clearance and subsistence activity during the Late Neolithic/Early Bronze Age, and the gradual escalation of this activity (including cereal production) during the later Iron Age and early historic periods. By the later medieval period, the landscape had been largely cleared of tree cover as a result of major land use intensification and arable cultivation, although the early post-medieval period appears to have witnessed a subsequent decline in land use intensity.

To date there are no published pollen records from equivalent sites on the Fell Sandstone escarpment in the study area or the till-covered lowlands of the lower Tweed valley. However, deposits infilling a Lateglacial kettle hole in ice-contact sand and gravel deposits near Lilburn South Steads, *c*.5km south-west of Chatton (Fig. 2.1) have been demonstrated to contain a sediment record dating from *c*.13400 cal BC and potentially spanning the entire Holocene period (Jones *et al*. 2000). This investigation has yielded a detailed faunal and floral record of the local environment within and surrounding a small kettle lake between the Windermere Interstadial and the early Holocene up to *c*.7000–6000 cal BC. During the relatively mild climate of the early Windermere Interstadial the sand and gravel terrace adjacent to the kettle lake supported a birch-juniper scrub with grassland. The later part of the interstadial saw development of birch woodland with subsidiary scrub and herbs, before climate cooling at the end of this period led to a decline in both woodland and lake fauna. Woodland was replaced during the periglacial climate of the Loch Lomond (Younger Dryas) Stadial by tundra-like vegetation including dwarf birch and willow scrub, while lake fauna were extinguished. Birch scrub was then re-established at the onset of Early Holocene warming before the rapid development of birch- and then hazel-dominated woodland. Subsequently there was a period of woodland decline with an increase in grassland and marsh that is presumed to have occurred sometime between *c*.7000 and 6000 BP; it is unclear, however, whether this trend reflects a transition to a cooler and wetter climate and/or woodland clearance in the vicinity of the kettle lake by Early Mesolithic people (Jones *et al*. 2000).

Further pollen records from valley floor localities in the in the Breamish-Till valley have been obtained from alluvial peat deposits, both within the study area at Brandon Quarry (Powburn) (Tipping 1992; 1994a; 1996) and north-east of the Till study block in the Milfield Basin at Akeld Steads (Borek 1975; Tipping 1998) and Wooler Water, a tributary of the Till (Clapperton *et al*. 1971; Tipping 1994a) (Fig. 2.1). At Akeld Steads a 4m thick sequence of floodbasin peat and interbedded alluvial sediments spans the onset of the Holocene period up to *c*.950 cal BC (Tipping 1998). Pollen evidence here records the development of a local wetland and surrounding floodplain woodland that from *c*.7400 cal BC is dominated by alder. Fluctuations in alder cover during the middle Holocene coincide with flood sediment deposition and are interpreted as flood-induced disturbance, and it is not until the early first millennium BC that the pollen record indicates an expansion of grassland that may reflect local human activity. The pollen record from Powburn is derived from three separate and thinly developed alluvial peat deposits, but also shows evidence of woodland clearance both on and near the floodplain occurring after *c*.850 cal BC (Tipping 1992; 1994b).

Methods

Geomorphological analysis of valley floor landform assemblages

The primary requirement for the development of a landform element classification for the project was a geomorphological map of the Till-Tweed landscape. Mapping and delimiting of landform assemblages in the study area was greatly facilitated by LiDAR (Light Detection and Ranging) data of the valley floor topography. LiDAR is an airborne mapping technique that uses a laser to measure the distance between the ground surface and the surveying instrument. Combined with a linked GPS survey to locate survey points, the technique offers a rapid and cost-effective means of deriving high-resolution, georeferenced topographic data over large areas (e.g. Charlton *et al*. 2003; Saye *et al*. 2005; Challis 2006). This technique enabled a complete geomorphological mapping survey of valley floor landforms throughout the survey area within the timeframe of the project remit. LiDAR flights and data preparation for this study were commissioned from the Environment Agency; a total of 358km^2 of the valley floor within the study area was surveyed along the river axis, giving data points with 2m horizontal spacing and a vertical resolution of ±0.2m. These data were then rendered as digital elevation models (DEMs) in GIS (ArcGIS) and used as the basis for geomorphological mapping.

Mapping was also informed by analysis of historic and modern O.S. maps, regional geological maps, published articles on the soils (Payton 1980; 1992) and geomorphology (including Clapperton 1971a and b; Payton 1980; Tipping 1994a; 1998) of the study area and a programme of field visits. The resolution of mapping varied according to available data sources; for areas within the LiDAR cover (accounting for *c*.64% of the study area), mapping sought to identify all major valley floor landform assemblages of glacial, glaciofluvial and fluvial origin. Particular attention was focused on fluvial valley floor environments where mapping sought to delimit terrace scarps, floodbasins and palaeochannels. For parts of the study block that lay outside the LiDAR coverage, mapping was undertaken at a lower resolution equivalent to the scale of landform-sediment assemblages differentiated by drift geology maps. In these areas we have prioritised the identification of larger kettle holes and enclosed basins (that have the potential to preserve organic-rich sedimentary sequences), and have not yet attempted to produce detailed maps of individual kames, eskers and other ice-contact, glaciofluvial and sub-glacial landforms.

On the basis of the mapping programme, several sub-reaches of the Breamish/Till and lower Tweed valleys, ranging between 1 and 5km in valley length and representative of the range of valley floor environments in the study area, were selected for detailed sedimentological, palaeoecological and geochronological investigations. Four sites were located in the Breamish/Till valley upstream of the Milfield Basin, respectively between Powburn and Beanley and at Bewick Bridge, Newtown and Chatton (Fig. 2.1). Work in the Milfield Basin focused on two coring transects and discrete palaeochannel and floodbasin features across the entire alluvial valley floor between Weetwood and Milfield; palaeochannels were also investigated in the valley of the River Glen near Coupland (Fig. 2.1). In the lower Tweed valley investigations were focused on Coldstream and Green Hill (Horncliffe) (Fig. 2.1). At each site, sedimentary sequences representative of discrete fluvial valley floor units were investigated by examination of quarry faces and river bank sections (where available) and sediment coring using hand-operated augers that permitted recovery of continuous cores. Attention focused in particular on floodbasin and palaeochannel deposits, which form the most likely context for preservation of organic materials suitable for ^{14}C and palaeoecological analyses. Exposed sedimentary sequences and sediment cores were recorded with the aim of evaluating the depth of fluvial sediment (particularly with regard to the thickness of fine-grained alluvium), its character and evidence for buried soil horizons or organic-rich deposits.

All cores/sections were logged for colour, texture, bedding structures and inclusions (e.g. charcoal, organic matter, archaeological materials). Organic-rich sedimentary sequences were sampled as continuous bodies (either in cores or monolith tins) and removed intact to the laboratory for storage and sub-sampling (see below).

Geochronology

A programme of ^{14}C analysis was developed in collaboration with the English Heritage Scientific Dating team with the aim of establishing (i) a model of valley floor evolution that may be related to archaeological periods and their likely preservation and/or burial potential, and (ii) the maximum age of pollen, plant macrofossil and insect assemblages recovered from selected sedimentary sequences. A total of 35 samples was selected for ^{14}C dating from sedimentary sequences in the different valley floor environments of the identified sub-reaches. All dates quoted below (unless stated otherwise) are calibrated date ranges (95% confidence intervals) calculated by the maximum intercept method (Stuiver and Reimer 1986), using the program OxCal v.3.5 (Bronk Ramsey 1995; 1998; 2001) and the INTCAL98 dataset (Stuiver *et al*. 1998). Some samples were analysed for both humin and humic acid fractions, and the consistency of the results was statistically tested by the method of Ward and Wilson (1978). The same test was also applied to submissions of paired macrofossils from the same sample level. In addition to this dating programme the project has drawn on published radiocarbon dates in Tipping (1992; 1994a; 1998), Payton (1980), Passmore *et al*. (2002), Johnson and Waddington (in press) and unpublished dates obtained by Passmore and Houghton (River Till, Milfield Basin) and Passmore and Macklin (River Tweed, Coldstream).

Analysis of the chronology of recent historic river channel and floodplain development has been obtained from analysis of Ordnance Survey maps dating from the mid-nineteenth century.

Palaeoecological analyses

Palaeoecological analyses were undertaken to evaluate the potential of recorded sedimentary sequences for yielding information on Holocene valley floor environments. A particular focus on alluvial peats and organic-rich channel fills has been adopted here as these constitute palaeoenvironmental resources that have the potential to facilitate 'off-site' reconstruction of Holocene vegetation and land-use changes on the valley floors of the study area. Although organic-rich alluvial palaeochannels and floodbasins have received comparatively little attention by the earth science and archaeological community, they constitute a potentially important means of evaluating valley floor palaeoenvironments (e.g. Brown 1997; Passmore and Macklin 1997; Fyfe *et al*. 2003). In particular, since (i) alluvial sedimentary sequences are often proximal to fertile valley side and alluvial soils, which are well-suited to agricultural activity, and (ii) pollen rain in these spatially restricted environments is typically derived from predominantly local floodplain and adjacent terrace sources, Holocene palaeochannel and floodbasin sediments may hold the key to elucidating the patterns and nature of human activity over low-lying parts of the study area that are characterised by a limited or negligible range of recorded archaeology (e.g. Moores *et al*. 1999). Indeed, these sedimentary records may be an especially valuable means of detecting agricultural activity (notably cereal production). Previous work has demonstrated that cereal-type pollen is more likely to be recorded if samples are taken close to edges of wetlands where arable crops may have been growing in the immediate vicinity, although studies in alluvial contexts also acknowledge potential problems of interpretation of alluvial pollen (e.g. Brown 1997). The latter include the re-mobilisation and secondary deposition of polleniferous sediment, difficulties in discerning between natural and anthropogenic vegetation disturbance in episodically active geomorphological settings and the potential blanking of disturbance indicators by the dynamics of dense alder carr development in these wetland environments. Nevertheless, the utility of this geoarchaeological approach to evaluating land use histories in alluvial environments has already been demonstrated in northern England (Passmore and Macklin 1997; Moores *et al*. 1999) and elsewhere in Britain (e.g. Brown 1997).

Accordingly, all fine-grained organic rich sedimentary sequences recovered and stored were assessed for content and preservation of pollen, with selected sedimentary sequences further subjected to a full pollen analysis. In addition, organic-rich sediments recovered from the Till and Tweed study blocks (as part of the ALSF-funded Till-Tweed project) were also assessed for plant macrofossils and insect fauna.

Pollen analysis

Pollen analysis followed a two-stage programme. In the first stage an assessment of pollen preservation and content was undertaken on all organic-rich sediment units recovered during the coring programme (Passmore *et al*. 1998; van der Schriek and Passmore 2004). A total of 236 samples was processed during these phases of the analysis, with pollen counts of up to 100 land pollen grains (or 10 traverses of the slide) undertaken for each level. On the basis of these preliminary analyses, stage two of the pollen programme undertook a detailed analysis of organic-rich sediments in 23 sediment cores. These were selected on the basis of one or more of the following criteria; (i) they enabled sampling of environments in each of the main sub-reaches of the Breamish/Till/Tweed river valley floors, thereby ensuring a broad spatial coverage to the assessment; (ii) they sampled sedimentary sequences that are associated with differing fluvial terrace surfaces and/or discrete river channel belts and floodbasins within each sub-reach, thereby maximising the potential temporal span of analyses; (iii) they sampled the locations with the greatest depositional thickness of organic-rich sediments recorded in the study area (although some relatively thin sediment horizons were also selected for study where preliminary assessment indicated evidence of prehistoric anthropogenic activity); (iv) they contained pollen that was sufficiently well-preserved to enable successful analysis, and (v) they contained provisional evidence of anthropogenic activity on or near the valley floor. Stage two of the pollen analysis proceeded with pollen counts of no less than 500 land pollen grains for each level, and with sampling intervals spaced at regular intervals throughout the organic-rich sedimentary sequence.

Sample preparation for both stages of analysis followed standard laboratory techniques (Moore *et al.* 1989), with the exception of an additional stage prior to staining and mounting. This method, termed the 'Amsterdam technique' (Munsterman and Kerstholt 1996), uses the heavy liquid sodium polytungstate to separate excess fine minerogenic material from the sample. Lycopodium tablets were added to each of the samples prior to preparation to allow the determination of pollen concentration (Stockmarr 1973).

Plant macrofossil content and preservation

Analysis of plant macrofossils is recognised as complementing pollen-based palaeoecological assessments by providing additional information on local environments and assisting in the differentiation of vegetation types of archaeological significance (notably cereals and grasses). Seventy samples from the Till and Tweed study blocks were assessed for plant macrofossil content and preservation, with sampling intervals being matched to unit thickness as appropriate. Sub-samples were extracted from stored sediment cores and prepared for plant macrofossil assessment following standard techniques (Dickson 1970; Watts 1978; Birks 1980). Samples were weighed then sieved through a 125μ mesh, with the remaining contents transferred to a beaker containing distilled water. These were scanned with a low-power binocular microscope and all identifiable botanical remains were extracted and identified using modern published reference material. Plant macrofossil data were interpreted via comparison with published data of vegetation communities (Rodwell 1992, 1995, Stace 1997).

Insect fauna content and preservation

Analysis of fossil insect fauna has proven to be a valuable means of reconstructing the character of valley floor environments, particularly with respect to woodland and grassland habitats, and is included here to augment pollen and plant macrofossil assessment. A total of 51 samples from the Till and Tweed study blocks was assessed for insect fauna content and preservation, with sampling intervals being matched to unit thickness as appropriate. Sub-samples were extracted from stored sediment cores and were processed using the standard method of paraffin flotation (Kenward *et al.* 1980). Identification of insects followed the system for rapid 'scanning' of insect faunas (*sensu* Kenward *et al.* 1985). The majority of the taxa present are beetles (Coleoptera), although the cases and headcapsules of both cased and caseless caddis flies (Tricoptera) were recovered in a few samples.

In the discussion below it should be noted that the plant macrofossil and insect fauna analyses were undertaken in order to establish the potential of selected sites (and by implication other similar depositional environments) for yielding palaeoenvironmental information. Furthermore, in order to achieve adequate sample sizes it was frequently necessary to bulk material spanning depositional thicknesses in excess of 5–10cm, and hence the temporal and contextual resolution of the assessment is typically less than that achieved by pollen analysis. Accordingly, the analyses should be regarded as giving only a provisional assessment of species assemblages.

Landform element classification

Landform element classifications used in the Till-Tweed study are based on the system developed for the allied Milfield Basin study (*cf*. Passmore *et al*. 2002), but here have been extended to account for the greater range of terrain types encompassed by the study blocks (Passmore *et al*. 2006). Landform elements are classified according to their mode of geomorphological formation and are differentiated broadly into landforms dating from the Lateglacial period, deposited during Late Devensian deglaciation of the area sometime between *c*.16,000 and 9600 cal BC, and those of Holocene (post-glacial) age respectively. Particular attention has been paid to kettle holes, enclosed basins and fluvial palaeochannel and floodbasin environments given their potential to act as organic-rich sediment sinks over Holocene timescales. The full classification is listed in Table 2.1.

LANDFORM-SEDIMENT ASSOCIATIONS: PRE-QUATERNARY AND LATE DEVENSIAN LANDSCAPES

Bedrock with discontinuous shallow drift cover (Late Devensian) and undifferentiated Late Devensian glacial and glaciofluvial drift

Around one quarter of the landscape in the study area comprises glacially streamlined bedrock (typically between 500 and 150m OD) with localised and discontinuous shallow drift cover and scree slopes (Category 1a landform elements; Fig. 2.7, Table 2.1). These landform elements are characteristic of the Cheviot hillslopes to the west and the eastern margins of the Till valley, where outcropping Fell Sandstone forms prominent crags with commanding views west over the valley floor (Fig. 2.8).

Hillslopes at lower elevations, typically in the range between 50 and 270m OD, and extensive areas of the lowland landscape are mantled with a variable thickness of undifferentiated drift (Category 1b landform elements; Fig. 2.7). These landform elements comprise nearly 40% of the mapped study blocks (Table 2.1) and are particularly well-developed in the Breamish valley between Ingram and Powburn, on the lower valley sides to the east and north of the River Till and throughout much of the lower Tweed valley where they form upstanding terraced and undulating landsurfaces that lie up to 65m above the present valley floor. Geological maps of the region indicate the drift cover to comprise till and localised deposits of glaciofluvial sand and gravel. In the lower Tweed valley these deposits form a well-developed drumlinised landscape characterised by numerous individual and composite streamlined hillocks that have ellipsoidal planforms, are typically up to 500m long and oriented south-west to north-east (reflecting a north-easterly ice flow during the Dimlington Stadial) and with a typical elevation range of 10–20m (Lunn 2004; Figs 2.9; 2.10).

Category 1a and 1b landscapes have been extensively modified by erosional and depositional processes associated with Late Devensian ice flows and subsequent deglaciation. Geomorphological activity during the Holocene, however, will have been limited to localised colluviation, tributary stream gullying and accumulation of peat and sediment in hilltop and valley side depressions. Areas within these bedrock and drift-mantled landscapes that are liable to have experienced significant build-up of Holocene peat and/or sediment have been classified and delimited as discrete landform elements and are described below. These include peat bogs and mires (Category 2e) and small (and frequently underfit) tributary stream valleys (Categories 1e and 2b) and enclosed basins (Category 1e).

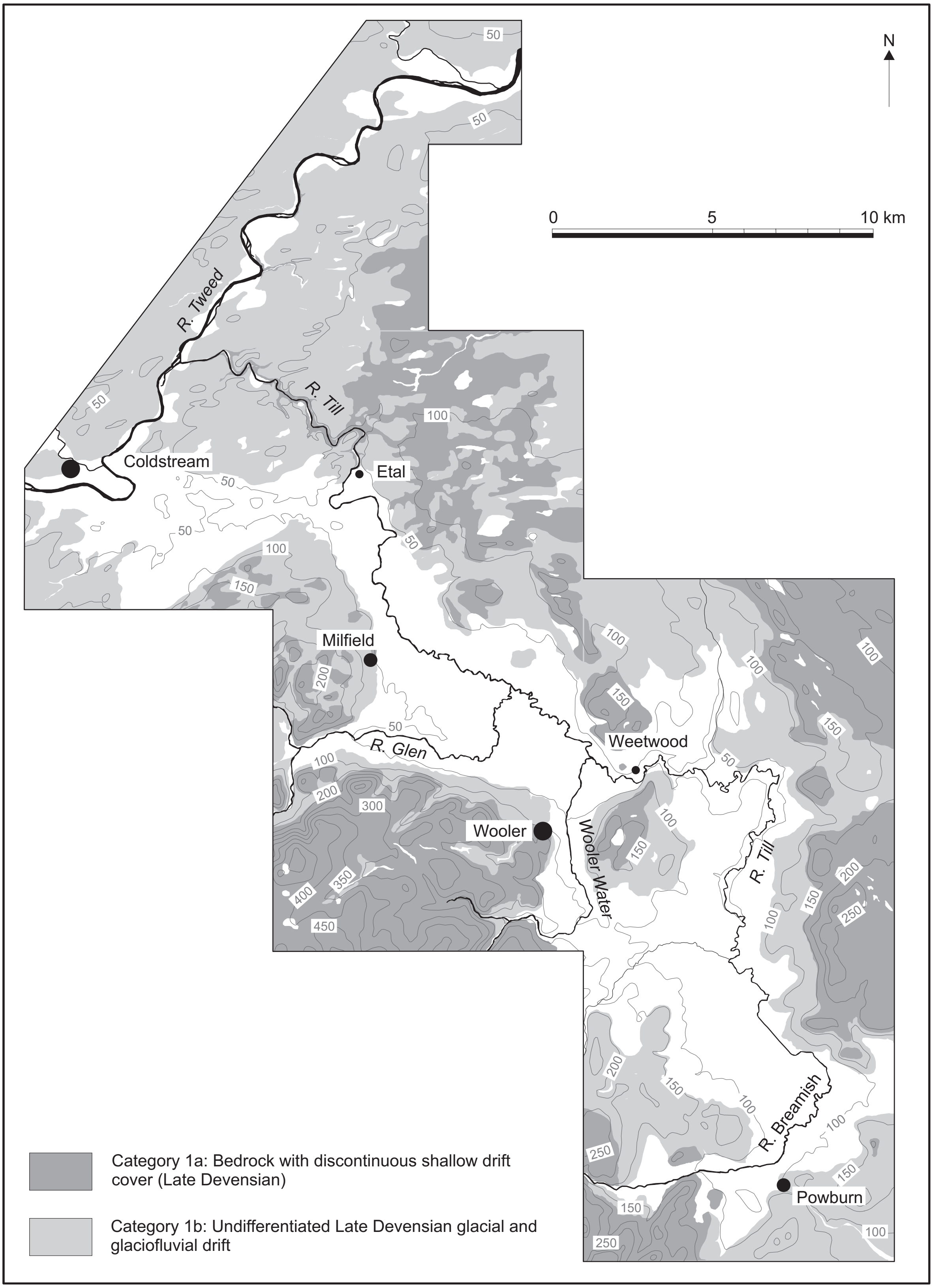


Fig. 2.7. Map of study area and regional topography showing (i) bedrock with discontinuous shallow drift cover (Category 1a landform elements) and (ii) undifferentiated Late Devensian glacial and glaciofluvial drift (Category 1b).

Landform element		Elevation range (m OD)	Till		Milfield		Tweed			total	
			km²	**%**	**km²**	**%**	**km²**	**%**		**km²**	**%**
1a	Bedrock with discontinuous shallow drift cover (Late Devensian)	80–315	58.39	10.48	79.71	14.30	6.81	1.22		144.91	26.00
1b	Undifferentiated Late Devensian glacial and glaciofluvial drift	30–270	73.38	13.17	58.59	10.51	84.64	15.19		216.61	38.87
1c	Late Devensian ice-contact meltwater deposits	30–150	51.95	9.32	10.57	1.90	18.74	3.36		81.26	14.58
1d	Late Devensian glaciofluvial and glaciodeltaic terraces	10–80	17.97	3.22	22.46	4.03	9.85	1.77		50.28	9.02
1e	Late Devensian and(or) Holocene palaeochannels and enclosed basins inset within 1b–d	10–100	0.66	0.12	4.16	0.75	1.82	0.33		6.64	1.19
1f	Late Devensian kettle holes inset within 1b–d	30–120	0.27	0.05	0.12	0.02	0.23	0.04		0.62	0.11
1g	Late Devensian glaciolacustrine deposits	40–100	2.08	0.37	1.17	0.21				3.26	0.58
1h	Late Devensian alluvial fans	60–150	0.47	0.08	0.30	0.05				0.77	0.14
2a	Holocene alluvial fans and colluvial spreads	10–130	0.37	0.07	0.11	0.02	0.10	0.02		0.59	0.11
2b	Holocene alluvial terraces and floodplain deposits (pre-nineteenth century)	2–130	10.21	1.83	16.18	2.90	7.46	1.34		33.68	6.08
2c	Holocene alluvial palaeochannels and floodbasins developed on 2b surfaces	2–130	1.01	0.18	0.83	0.15	0.77	0.14		2.62	0.47
2d	Nineteenth century and later river channel and floodplain deposits; modern channel and floodplain	0–130	2.88	0.52	2.57	0.46	4.55	0.82		10.01	1.80
2e	Holocene peat bogs/mires	40–240	1.09	0.20	2.31	0.41	0.36	0.06		3.76	0.67
3	Modern ponds/reservoirs	70–150	0.07	0.01						0.07	0.01
3	Modern quarry workings/airfield	10–90	0.92	0.16	1.12	0.20				2.04	0.37

Table 2.1. Description, area (km²) and elevation range (m OD) for landform elements delimited in the Till, Milfield Basin and Tweed valley study blocks.

Fig. 2.8. View over the Breamish (Till) valley looking southwest from the Fell Sandstone escarpment at Old Bewick, Till study block.

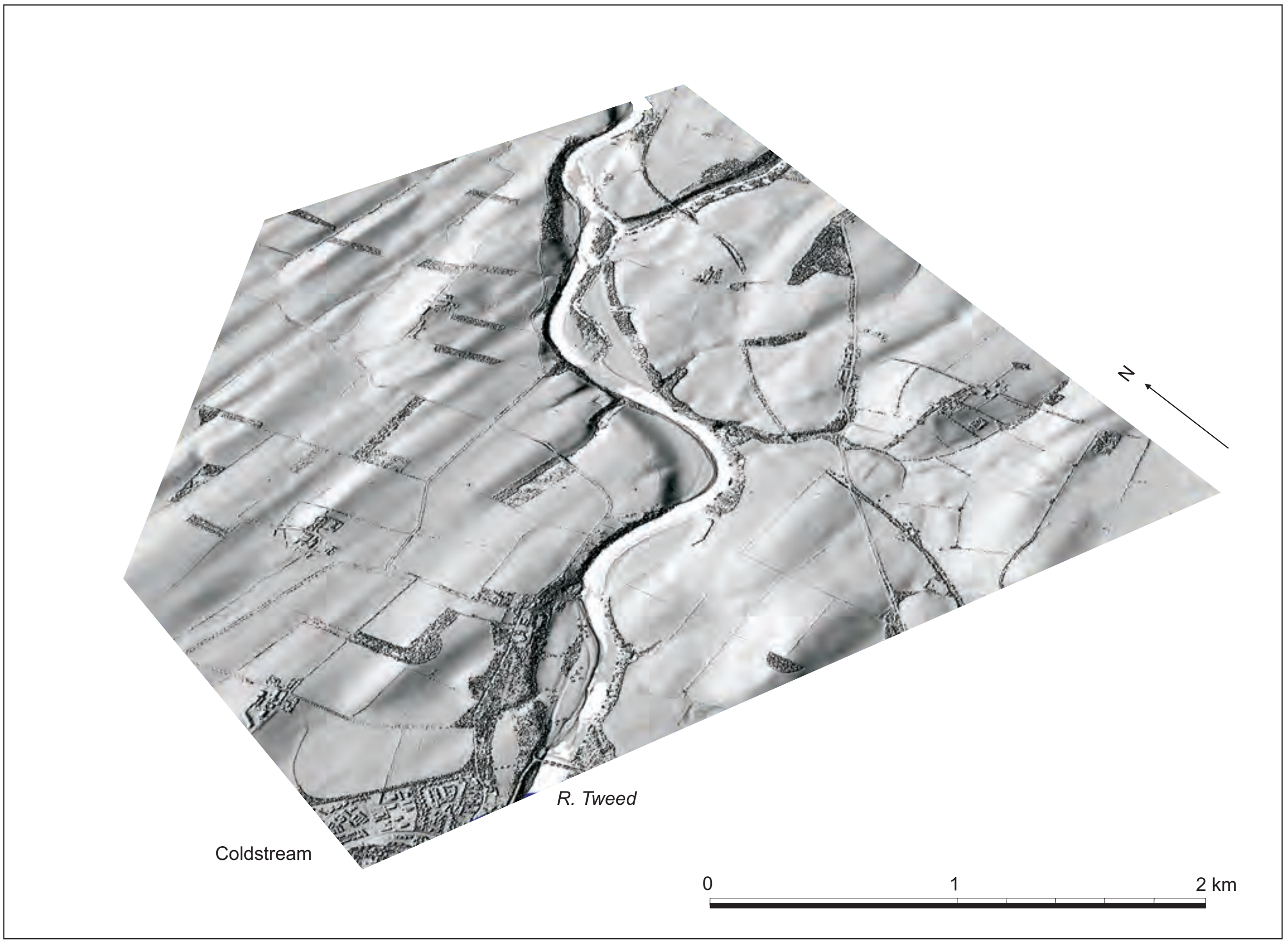


Fig. 2.9. LiDAR-derived image of landsurface topography around Coldstream (Tweed study block) showing drumlinised terrain and inset Late Devensian and Holocene alluvial valley floor.

Fig. 2.10. Drumlins near Cornhill on Tweed, Tweed study block.

Late Devensian ice-contact meltwater deposits

Extensive spreads of hummocky sand and gravel deposited as ice-contact meltwater sediments (Category 1c landform elements, Table 2.1) on the lower valley sides and valley floors of the Till and Tweed have long been recognised as reflecting local ice sheet stagnation and downwasting following the climatic amelioration at the end of the Devensian glacial maximum (see above). These deposits account for nearly 15% of the study area landsurface (Table 2.1) and are particularly well developed in the valley of the Breamish/Till where they form a near-continuous spread of sand and gravel between Wooler and Beanley (Fig. 2.11). Clapperton's (1970; 1971a and b) account of the deglaciation of the area describes this landform-sediment assemblage as a hummocky ice-contact esker and kame complex comprised of well-bedded and well-sorted sands and gravels, locally with a thin capping of ablation or flow till. The surface of this complex lies between 275 and 50m OD and the strongest relief is found on the western side of the valley floor in the Wooperton-Newtown-Chatton area, where local relief of up to 30m can be found between steep-sided ridge and mound tops and adjacent depressions. Towards the margins of this complex, and in spreads of meltwater sands and gravels to the north and east of the River Breamish/Till, the surface has a gently undulating relief with broad terraces and low-angle mounds (Figs 2.12 and 2.13).

Ice-contact meltwater deposits are of a comparatively limited extent in the Milfield Basin, here being interpreted as kame terraces by Clapperton (1971b), but a further extensive spread of hummocky sand and gravel mantles the northern footslopes of the Cheviots between Etal and Coldstream (Fig. 2.11). These deposits lie inset within undulating drumlinised drift in the lower Tweed valley at elevations between 20 and 60m OD and have been termed the Cornhill 'kettle moraine' (Sissons 1967). Smaller areas of hummocky outwash (less than 0.5km^2) are evident on the eastern side of the Tweed at West Newbiggin, 2km south of Norham, and in the south-west part of the Tweed study block near Wark (Fig. 2.11). The latter features a prominent esker-like ridge of gravel that lies 15m above the adjacent valley floor and has been exploited as a defensible location by the site of Wark Castle at its eastern limit (Fig. 2.14).

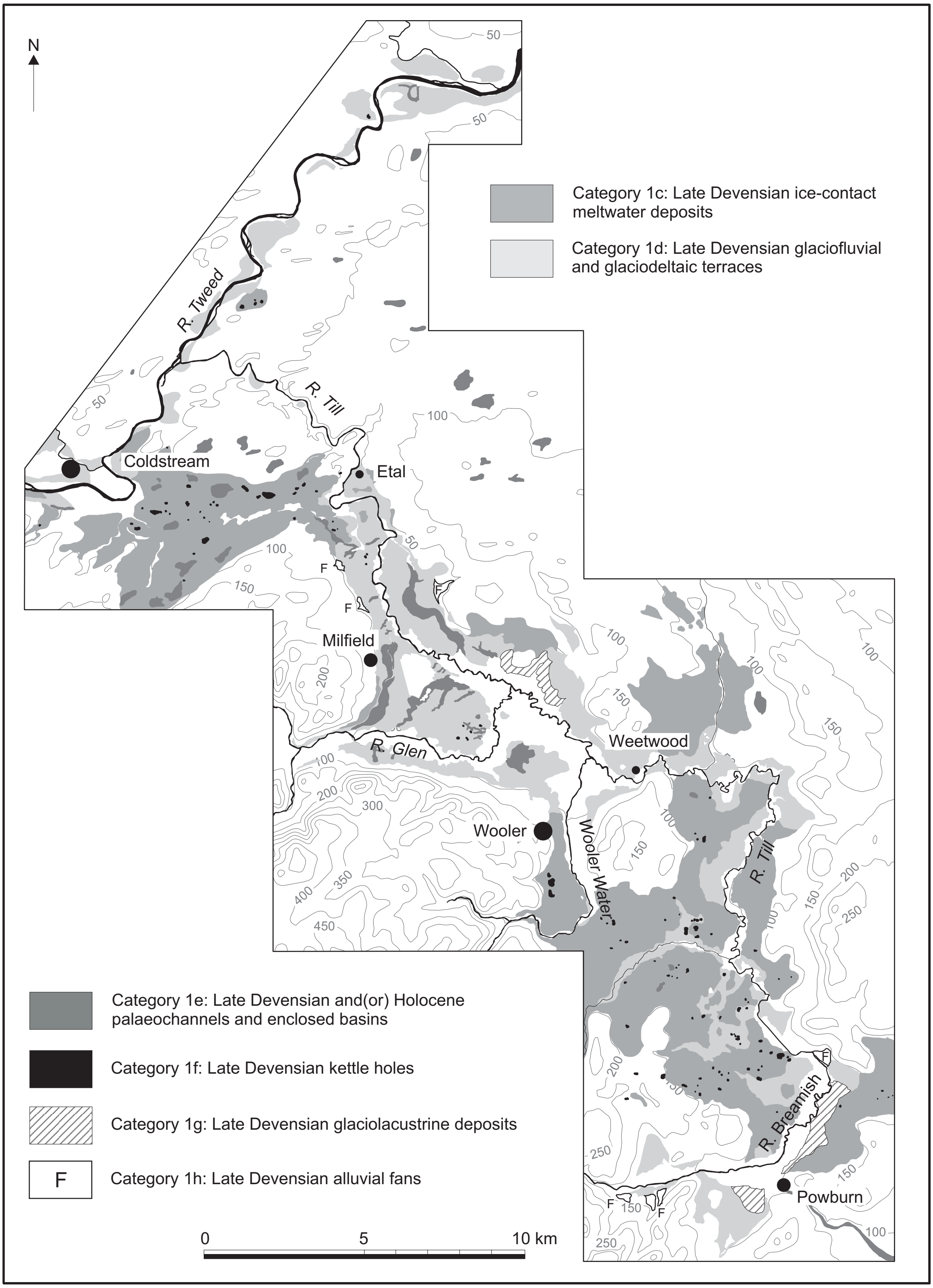


Fig. 2.11. Map of study area and regional topography showing depositional landform elements associated with Late Devensian deglaciation (Categories 1c–1h; see text for details).

Fig. 2.12. Ice contact meltwater deposits (kames) near Roseden Crossing, Breamish (Till) valley.

Fig. 2.13. Ice-contact meltwater deposits and quarry exposure near Wooperton, Breamish (Till) valley.

Late Devensian glaciofluvial and glaciodeltaic terraces

A further group of terraced gravels, sands and finer sediments has been identified on the margins of and locally inset within the Category 1c outwash surfaces; these form flat or gently undulating and locally gullied terraces that lie up to 5m below ice-contact deposits and are perched between 1 and 10m above the Holocene alluvial valley floor (Fig. 2.11). They are classified here as glaciofluvial or glaciodeltaic outwash deposits (Category 1d landform elements; Table 2.1; Fig. 2.11) that represent the localised fluvial reworking of ice-contact and other drift deposits during the later stages of regional deglaciation (Clapperton 1971b).

Terraces of this category constitute over 50km^2 of the mapped study area (9% of the total mapped landscape; Table 2.1) and are most extensively developed around the margins of the Milfield Basin (Fig. 2.11). A broad fan-shaped expanse of sand and gravel up to 10m thick spreads north and east into the basin from an apex at the mouth of the River Glen valley at Lanton (Fig. 2.15) and has been described by Clapperton (1971b) as an outwash delta built out into a large proglacial lake that filled the basin during deglaciation (see below). The surface of this feature has a maximum elevation of 69m OD at its apex and slopes north and east to margins at 40–42m OD (Fig. 2.15). Underlying sediments have been exposed by aggregate quarrying south-east of Milfield (Fig. 2.15) and have been described by Payton (1980) as comprising cross-bedded sands and cross-laminated sands and silts representing glaciodeltaic foreset beds, overlain by up to 2m of plane-bedded sandy gravels deposited by subaerial braided river channels. To the south and east this landform complex terminates in a locally well-defined terrace margin that rises 5–10m above the Holocene alluvial valley floor and the present River Till (Figs 2.15 and 2.16). However, an upstanding terrace fragment preserved on the north-east side of the Till between Fenton and Ford has surface elevations between 38 and 40m OD and most probably represents the distal part of the glaciodeltaic complex that has been dissected by the present river valley (Fig. 2.15).

A suite of sand and gravel terraces lie inset below the margins of the glaciodeltaic terrace in the Milfield Basin and have been interpreted by Clapperton (1971b) as glaciofluvial terraces that represent fluvial reworking of glaciodeltaic sediments. They are most extensively developed on both sides of the Till valley floor in the northern part of the basin between Milfield and Etal (Fig. 2.11) and have surfaces some 3–4m below the glaciodeltaic terrace. Mapping and sedi-

Fig. 2.14. View from the site of Wark Castle, lower Tweed valley, looking west along an esker ridge.

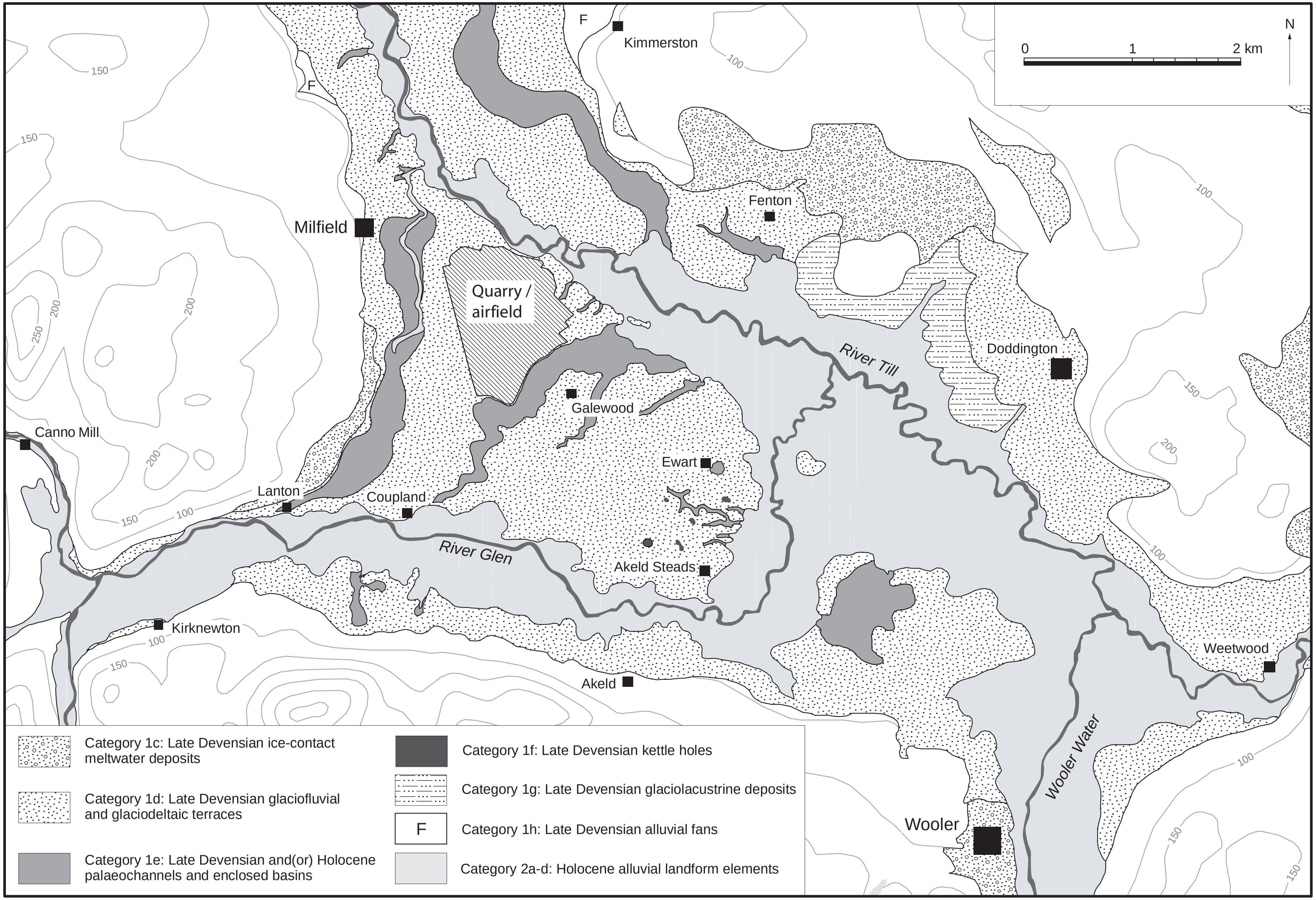


Fig. 2.15. Map of Milfield Basin showing Late Devensian landform elements associated with deglaciation (Categories 1c–h), Holocene alluvial landform elements (Categories 2a–d) and site of Milfield airfield and aggregate quarry (Category 3).

ment coring undertaken for the Milfield Basin project has identified a further group of low-lying sand and gravel terraces in the southern and western parts of the basin in areas that have been previously mapped as Holocene alluvium (Payton 1980; 1992; Tipping 1998; Fig. 2.15). The largest terrace in this group lies inset below glaciofluvial and glaciodeltaic deposits between Akeld Steads and Turvelaws and has a gently undulating surface 1–2m above the main Holocene alluvial surface. This terrace is traversed by the artificially straightened course of the Humbleton Burn, a small tributary of the present River Glen that rises on the northern flanks of the Cheviot Hills (Fig. 2.15), and has been shown by sediment cores (Appendix A) and archaeological test pits (Chapter 3) to comprise well to poorly-bedded inorganic gravelly sands and silts. A smaller terrace remnant of this assemblage is evident 1 km east of Ewart where it forms a localised low-relief sand and gravel surface that is completely surrounded by Holocene alluvium (Fig. 2.15). Both terraces have gently dipping margins that are onlapped by Holocene silts and clays, but higher-level gravelly surfaces to the east of Akeld Steads have been shown by aerial photographs to exhibit a well-developed pattern of polygonal ice-wedge casts (Tim Gates pers. comm.). Accordingly these terraces are interpreted as reworked glaciodeltaic and glaciofluvial sediments that were deposited as a low-angle fan during incision of the River Glen through the main delta surface and underlying glaciolacustrine sediments following drainage of the proglacial Lake Ewart (see below).

In valley floors elsewhere in the study area, Category 1d terraces are locally present as discontinuous low-relief terraces overlooking Holocene alluvial surfaces and the present channel of the Breamish/Till and lower Tweed (Fig. 2.11). Published information on the sedimentary composition of these landform elements is limited to a description of a terrace unit lying near Wooperton in the Breamish valley (Fig. 2.11); this terrace lies inset within the south-east margins of ice-contact meltwater (Category 1c) deposits at Wooperton and slopes gently south and east towards a break of slope between 4 and 9m above the main Holocene alluvial surface of the Breamish (Clapperton 1971b; Fig. 2.11). Auger survey of this terrace revealed a north-west to south-east fining of subsurface sediments from gravels through sands to micaceous silts on the south-east terrace margins. Clapperton (1971b) interprets this terrace as a glaciodeltaic or sandur deposit that prograded into a localised proglacial lake developed in this part of the Breamish valley (the Hedgeley Basin) and was fed by

Fig. 2.16. View of the glaciodeltaic terrace lying above the Holocene alluvial surface in the Milfield Basin near Thirlings. Note the former WW2 airfield building on the left, and ridge and furrow field system on the alluvial surface in the foreground.

meltwater streams emerging from downwasting ice to the north.

Recent small-scale gravel workings in the lower Tweed valley near Groat Haugh (NT88864547) have permitted a preliminary investigation of sediments associated with a local Category 1d terrace unit. Here the sedimentary sequence comprises over 6m of stacked, flat-bedded clast-supported sandy gravel below a thin sandy alluvial soil (Appendix A). These sediments are interpreted as the deposits of a high-energy aggrading river with a braided or anabranched channel network. Although no dating controls are available for this landform-sediment assemblage, the sedimentology and morphostratigraphy are consistent with deposition during the later stages of valley deglaciation with incision and reworking of tills and outwash sediment by sediment-rich meltwaters.

Category 1d landform elements are also interpreted as infilling the floors of wide channelised depressions that are cut through the ice-contact meltwater complex (Category 1c) in the Breamish valley between Wooler and Beanley (Figs 2.11 and 2.17). These form inset valleys oriented from south-west to north-east with low-relief surfaces lying 3–10m below adjacent meltwater deposits. They are presently occupied by the markedly underfit Lilburn Burn and Roddam Burn tributaries of the River Till, and most likely originated as meltwater channel networks; the presence of a well preserved esker-like ridge in the lower part of the Roddam Burn valley floor suggests that at least this meltwater system developed in an englacial context (Clapperton 1971b).

Late Devensian glaciolacustrine deposits and alluvial fans

Thick deposits of laminated silts, clays and occasionally fine sands identified and mapped in the Milfield Basin (Gunn 1895; Clapperton 1971b; Payton 1980) and the Breamish/Till valley between Beanley and Chatton (Clapperton 1971b) have been interpreted as glaciolacustrine sediments associated with the development of localised proglacial lakes during the later stages of Late Devensian deglaciation. Where deposits of this type lie at or near the modern land-surface (less than 1m deep) (following Payton 1980), they have been delimited by this study as Category 1g landform elements and in combination account for 3.26km^2 (less than 1%) of the mapped study area (Fig. 2.11; Table 2.1).

Clapperton's (1971b) account of the Milfield Basin proglacial lake deposits builds on earlier work by Gunn (1895), who described these sediments as reaching a thickness of at least 22m in the southern part of the basin. Payton's (1980) investigation of the Milfield Basin soils, while acknowledging the need for more detailed geomorphological analysis of the former lake sediments, described these deposits as reaching sur-

Fig. 2.17. Glaciofluvial terrace lying inset below hummocky ice-contact meltwater deposits near Roseden Crossing, Breamish (Till) valley.

face elevations of 42m OD on the margins of the basin, where they are locally overlain by alluvial sediments and soliflucted slope deposits. Clapperton (1971b) also argues for the development of a proglacial lake in the Breamish valley near Beanley (the 'Hedgeley Basin') which is evidenced by extensive deposits of well-laminated glaciolacustrine silts and clays. These have been mapped on the east side of the valley floor between Powburn and Beanley as a broad terrace over 2km^2 in extent with a surface elevation between 85 and 90m OD (Fig. 2.11). Some limited exposure of glaciolacustrine sediments is afforded by eroding riverbank sections in this reach, including the site at B18, 0.7km north-west of Beanley, where finely laminated silts and clays have been locally truncated by fluvial gravels of the 19th century and later floodplain (Appendix A). A radiocarbon age of 27,100 ± 200 ^{14}C years BP (SUERC-1149, Appendix A) has been obtained from these laminated fine sediments and although this date is likely to have been contaminated, at least in part, by older carbon and/or the hard-water effect, it is broadly consistent with the geomorphological interpretation of a glaciolacustrine origin for this landform-sediment assemblage.

Lateglacial alluvial fans (Category 1h landform elements; Fig. 2.11; Table 2.1) form a comparatively small proportion of the mapped study area (totalling less than 1km^2), but locally form prominent fan-shaped sloping surfaces that lie downstream of shallow tributary valleys cut into the hillslopes in the Breamish/Till valley. At present these features lack independent dating controls but they are provisionally assigned to the Lateglacial period on account of their scale and morphostratigraphic relationships in the Breamish between Ingram and Old Bewick; here the fans grade to glaciofluvial terrace (Category 1d) surfaces and are truncated by smaller valley and fan systems that are presumed to be Holocene in age (see below). These fan systems were most probably deposited by meltwater and local tributary erosion during the later stages of deglaciation prior to the stabilisation of valley slopes by Holocene soil and vegetation development.

Late Devensian palaeochannel deposits, enclosed basins and kettle holes

Late Devensian palaeochannels (Category 1e landform elements), enclosed basins (also Category 1e) and kettle holes (Category 1f) collectively form less than 8km^2 of the mapped study area (Table 2.1; Fig. 2.11), but have been classified as discrete landforms on account of their propensity to act as long-term sediment traps.

Kettle holes (Category 1f)

The thickest depositional sequences of Lateglacial and Holocene sediments are most likely to have accumulated in kettle hole depressions. These features are abundant on ice-contact meltwater landscapes and lower-relief glaciofluvial terraces in the Breamish/Till valley between Wooler and Beanley and on the northern flanks of the Cheviots between Coldstream and Etal (Fig. 2.11). Mapping for this project was confined to larger kettle holes that were readily apparent on the combination of LiDAR, aerial photograph and Ordnance Survey map coverages; these typically have sub-circular planforms and diameters between 20 and 40m (Fig. 2.18), although smaller examples may also survive in other parts of the outwash landscapes.

Investigations of a kettle hole fill immediately northwest of Lilburn South Steads (NU 4028 6243), near Chatton (Fig. 2.11) by Jones *et al*. (2000) has proved the potential of these features for preserving thick sequences of Lateglacial and Holocene sediments, and including organic-rich deposits. The kettle hole at this location is one of the larger examples in the study block with a surface area of *c*.21,000m^2. Borehole transects found fine-grained kettle-fill deposits overlying gravels to reach a thickness of 10m with a basal fill of detritus and calcareous mud, overlain by up to 3m of *Carex* peat with *Betula* and *Salix* remains. Radiocarbon dating of the sequence presented problems of interpretation due to the assays returning ages between 1000 and 2500 years older than biostratigraphical evidence (including pollen, ostracod and molluscan data) from the site. Such discrepancies have been noted in similar geological and geomorphic contexts elsewhere in the UK (e.g. Walker *et al*. 1993) and may be attributable to contamination of samples with older carbon from detrital inwash and hard-water errors. Accordingly, the authors resort to correlation of biostratigraphic associations to constrain the chronology of the kettle-fill deposits. On this basis, the Lilburn Steads sequence between 2.5–8.5m in depth spans the Windermere Interstadial, Loch Lomond (Younger Dryas) Stadial and the Early Holocene to *c*.7000 cal BC (Jones *et al*. 2000). No analysis was undertaken on the Middle to Late Holocene sequence at this site.

Lateglacial palaeochannels (Category 1e)

Glaciodeltaic and glaciofluvial terraces are occasionally traversed by inset channel-like depressions with broad, low-relief floors and are frequently occupied by markedly underfit tributary streams connecting the flanking uplands with trunk rivers (Fig. 2.11). They are particularly well developed in the Milfield Basin, both on the main glaciodeltaic surface where they have been described as former courses of the proto-River Glen (Payton 1980; Fig. 2.15), and on downvalley glaciofluvial terraces between Milfield and Etal. These features have been investigated by sediment coring at two localities where depressions feature poorly drained areas of marsh (Galewood, near Thirlings; Fig. 2.15) or small channel networks (Kimmerston Bog, near Kimmerston; Fig. 2.15).

Coring of the wetland depression at Galewood

Fig. 2.18. Kettle hole inset within hummocky ice-contact meltwater deposits near Roseden Crossing, Breamish (Till) valley.

found coarse sandy gravels at a maximum depth of 130cm to be overlain by slightly organic fine sand, silt and clay and, at the base of the sequence, *c*.25–30cm of humified peaty silt (Appendix A). These deposits have been mapped as Holocene peat bog and mire (Category 2e, see below), but recent geoarchaeological investigations associated with the Cheviot Quarry (Johnson and Waddington in press) have dated the upper and lower levels of the basal peaty sediments to *c*.11,470–11,300 cal BC and 12,440–12,040 cal BC, respectively (Appendix A). Sediment accumulation at Galewood therefore appears to have commenced in the Lateglacial (Windermere) Interstadial. Localised deposits of peaty silt and clay up to 35cm thick have also been recorded in small palaeochannel depressions developed along the south-west margin of the Lateglacial channel belt at Kimmerston Bog (Appendix A). These organic sediments are typically buried beneath inorganic sands, silts and clays at depths between 70 and 100cm and are highly localised in extent. No dating controls are currently available on these deposits.

On the southern margins of the study area a narrow Lateglacial palaeochannel cuts through undifferentiated drift and breaches the Fell Sandstone ridge at Shawdon Dean (Fig. 2.11). Termed the Shawdon Dean palaeochannel by Clapperton (1970; 1971a and b), this forms a 5km long and up to 30m deep meltwater channel that links the Breamish valley to the valley of the river Aln to the south. When active the channel intake was located at Powburn where the present valley floor of the Dean lies at an elevation of 85m (Fig. 2.11). The valley floor has a humped long-profile, rising to 98m within a kilometre of Powburn before descending to an elevation of 60m in the Aln valley. Clapperton (1971a) notes, however, that this profile may reflect subsequent infilling of the valley floor and cites borehole evidence of 14m of sediment above bedrock near the crest of the profile. Shawdon Dean appears to have played an important role in the regional deglaciation history since it provided the sole outlet for meltwater converging on the Breamish valley between 130 and 85m.

Lateglacial enclosed basins (Category 1e)

Enclosed basins (Category 1e) in the study area are generally larger than individual kettle holes with surface areas between 0.03 and 0.30km^2, and are frequently occupied by ponds or wetlands. The mode of origin of fully enclosed basins is unclear, but they may represent coalesced kettle holes, melt-out of large buried ice blocks or rafts and/or localised sub-glacial scour. This landform category also includes large near-enclosed depressions that are drained by artificial ditch networks or are occupied by clearly underfit streams. At present there is no information available on the sedimentary fill of these basins, although these

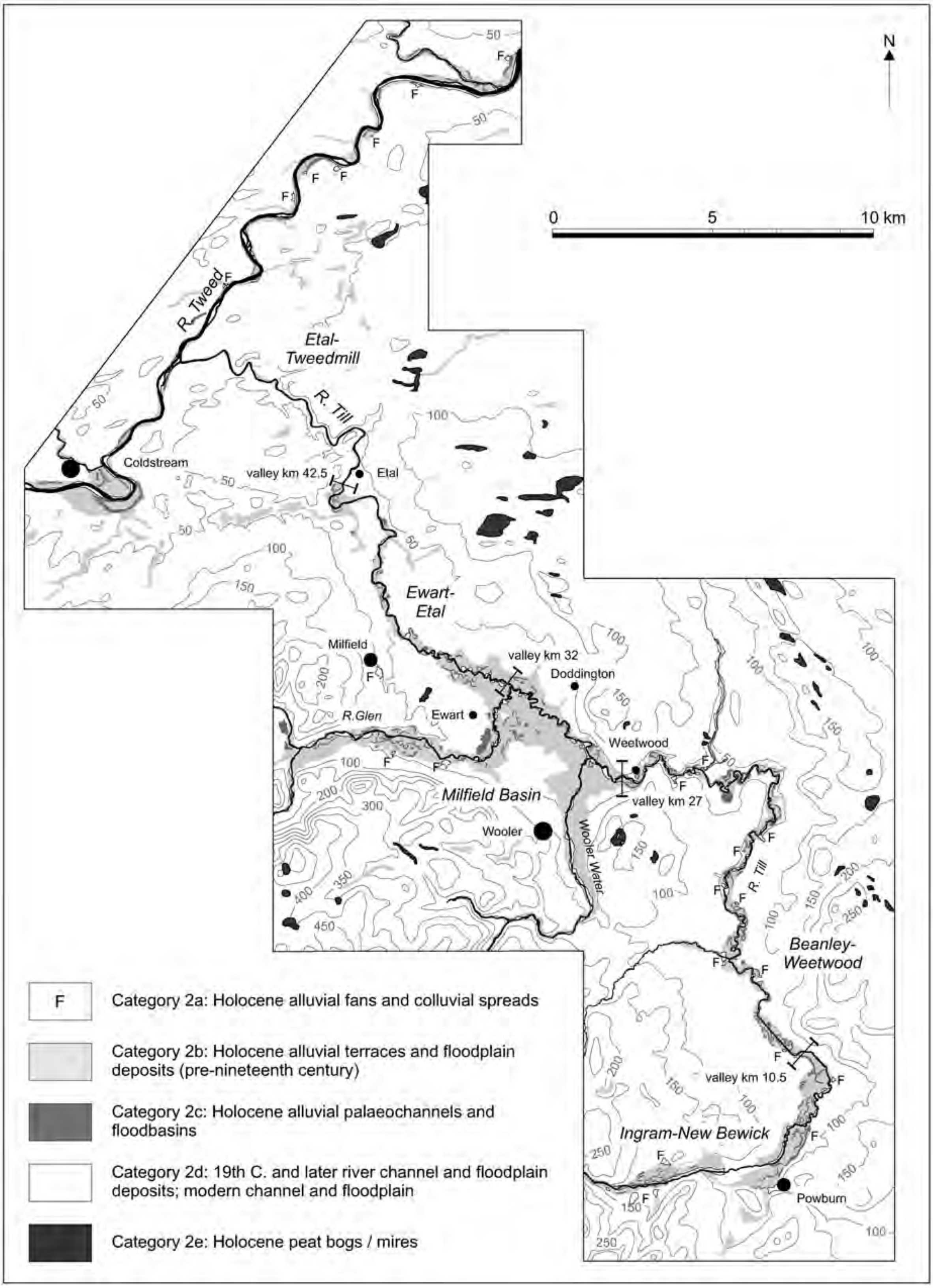


Fig. 2.19. Map of study area and regional topography showing landform elements of Holocene age (Categories 2a-e) and river sub-reach classification (see text for details).

depressions clearly have the potential to act as long-term sediment sinks for localised colluvial, alluvial and peaty deposits.

LANDFORM-SEDIMENT ASSOCIATIONS: HOLOCENE LANDSCAPES

Landform elements in the study area that are of exclusively Holocene age include river channel and floodplain environments (Categories 2b–d), alluvial fans and colluvial deposits (Category 2a), peat bogs and mires (Category 2e) and modern ponds, reservoirs and quarry workings (Category 3) (Table 2.1: Fig. 2.19). Collectively these landscapes account for less than 10% of the total mapped landsurface within the study area (Table 2.1), but they include environmental settings where the archaeological record is most liable to have been disturbed and/or buried by Holocene geomorphological processes.

Holocene river and floodplain landscapes

Holocene river channel and floodplain environments flank the present River Breamish/Till and lower Tweed in near-continuous spreads throughout the study area, and are also locally present in the valley floors of tributary streams (Fig. 2.19). Alluvial valley floors have been differentiated as pre-19th century terrace and floodplain surfaces (Category 2b), pre-19th century palaeochannel and floodbasins developed on 2b surfaces (Category 2c) and 19th century and later channel and floodplain deposits (Category 2d; Table 2.1; Fig. 2.19); these landform elements constitute 6.08%, 0.47% and 1.80% respectively of the total landsurface within the study area (Table 2.1).

Fluvial landform-sediment assemblages are described below in the context of 7 sub-reaches of the Breamish/Till and lower Tweed that are broadly representative of channel and floodplain morphology and sedimentary sequences in these valley floors. Sub-reaches are illustrated on Figure 2.19 and also on Figure 2.20 which illustrates the long-profiles of the Breamish/Till and the lower reaches of the River Glen, plotted against valley km downstream from the entry of the Breamish into the study area near Ingram.

1. Ingram-New Bewick (River Breamish)

The River Breamish leaves its confined Cheviot upland valley at Ingram and enters the study area at an elevation of 140m OD (Fig. 2.20). From here it flows east to New Bewick in a 10.5km sub-reach with a terraced fluvial valley floor up to 1km wide (Fig. 2.21). Channel gradients are relatively steep in the upper part of the reach (0.011m/m^{-1}) but decline below the A697 road crossing in the lower part of the reach to 0.0044m/m^{-1} (Fig. 2.20). Terrace and floodplain margins are well defined and inset up to 10m below Late Devensian glacial, glaciofluvial and glaciolacustrine deposits. The present river is characterised by a low-sinuosity gravel bed channel that is locally divided by unstable active gravel bars (Fig. 2.3), and historic (O.S.) maps indicate that the channel in this reach has been characterised by episodic channel division and lateral migration since the mid-19th century. This activity has been focused in a narrow belt up to 190m in width and forms the 19th century and later channel and floodplain corridor (Category 2d, Fig. 2.21).

Holocene alluvial deposits pre-dating the nineteenth century flank the River Breamish throughout the study reach and are particularly extensive between Ingram and Heddon/East Hills, and between Brandon (Powburn) Quarry and Beanley (Fig. 2.21). Aggregate extraction at Brandon Quarry has removed or reworked much of the fluvial record in this part of the valley. However, the valley fill is well preserved in the upper part of the reach, between Ingram and Brandon Quarry, where a low-relief terrace surface lying 1.5–2m above the modern floodplain forms the most extensive fluvial unit in this reach of the valley (Terrace T1). The terrace surface features numerous low-sinuosity palaeochannels that have been locally modified and incorporated into an extensive series of extant ridge and furrow field systems (Fig. 2.22).

The sedimentary sequence and chronology of the main (T1) terrace has been locally investigated by Tipping (1992; 1994b) at Brandon Quarry, where sediments were found to comprise up to 4m of well-bedded sandy gravels with buried shallow and fine-grained channel fills with organic-rich lenses. Radiocarbon dates obtained from four organic-rich channel fills gave calibrated date ranges of *c.*10,000–9250 cal BC, *c.*830–380 cal BC, *c.*410 cal BC–cal AD 130 and *c.* cal AD 20–320 respectively (Appendix B). Further investigations of the sedimentary sequence in Brandon Quarry as part of this project were greatly limited by the wet-working aggregate extraction techniques that are currently in operation, and the degraded nature of exposures in the upper part of the quarry faces (Fig. 2.23). However, available exposures and examination of sediment blocks excavated by quarry machinery suggest the general sedimentary sequence here comprises between 3 and 7m of well-bedded sandy and clast-supported gravels that overlie up to 3m of coarsening-upward clayey silts and well-sorted sands. This sequence is underlain across the width of the valley by finely laminated silt/clay of undetermined thickness (Appendix B), which is provisionally interpreted as glaciolacustrine sediment associated with the period of proglacial lake development during deglaciation of the Hedgeley Basin (after Clapperton 1971b; see above). Radiocarbon dates from this basal unit gave anomalously young dates and were rejected on the basis of likely contamination during sampling (Appendix B).

The T1 terrace surface extends downvalley of

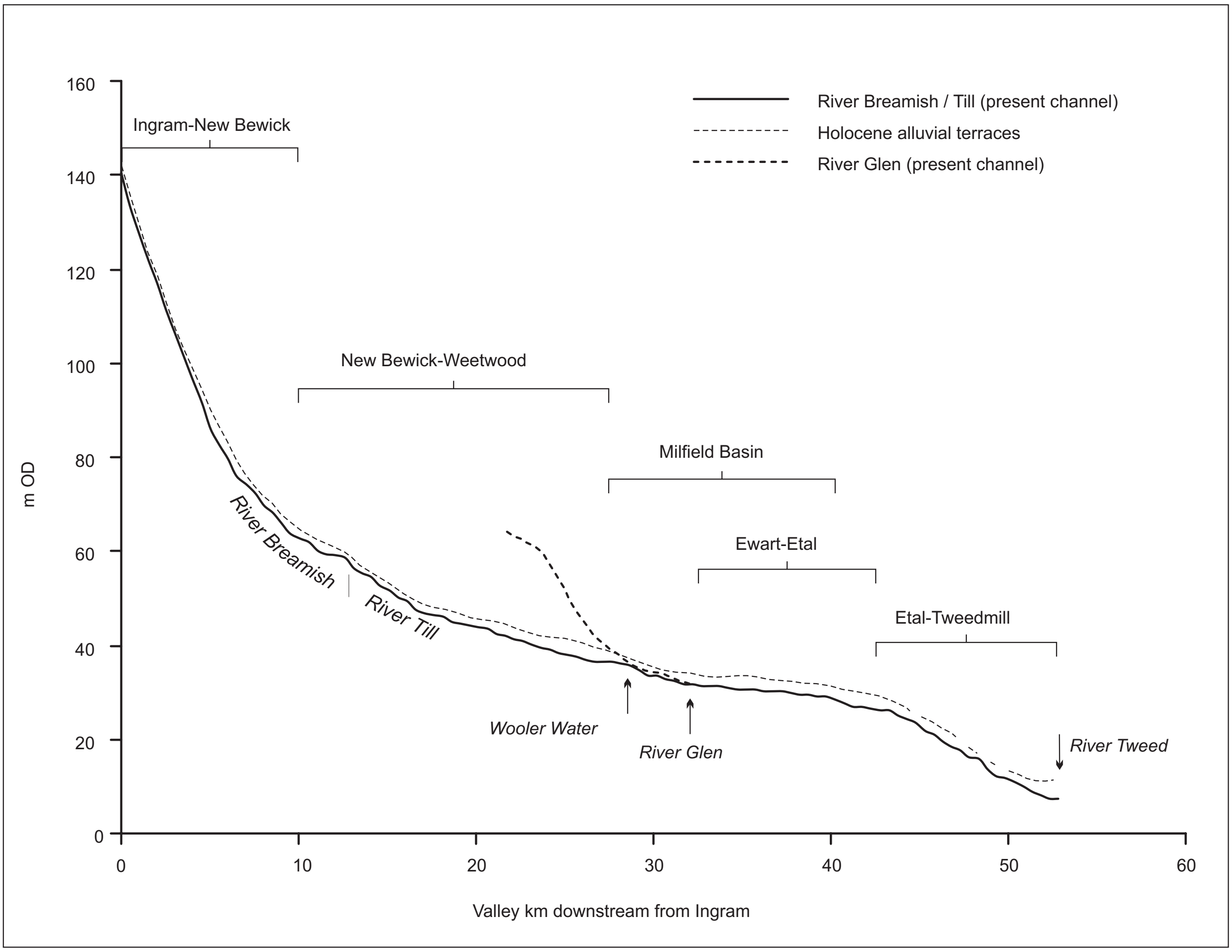


Fig. 2.20. Long-profile of the present River Breamish/Till channel and typical elevation of flanking Holocene alluvial surfaces. Also shown is the profile of the tributary River Glen below Canno Mill, the confluence of the Wooler Water and the Till and sub-reach classifications described in the text.

Brandon Quarry and its sedimentary sequence was further exposed during project fieldwork by aggregate extraction at Hedgeley Quarry (Fig. 2.21). Sediments at Hedgeley Quarry were logged at five locations within the quarry (Appendix B) and exhibited a stratigraphic sequence equivalent to that at Brandon Quarry, although the gravel member here is less thickly developed (up to 4m) than at the upstream locality. Two *Alnus glutinosa* tree trunks buried within the gravel member gave dates of *c.*1490–1210 cal BC and *c.*3960–3650 cal BC, respectively, while a woody peat deposit from the base of a shallow palaeochannel fill 2m below the terrace surface was dated to *c.*800–410 cal BC (Appendix B).

Between Hedgeley Quarry and Beanley, the T1 surface persists as the most extensive Holocene alluvial fill in this part of the valley (Figs 2.21 and 2.24). Sedimentary sequences beneath the terrace surface have been investigated at several sediment core and river bank locations (e.g. sites B9, 14–17, 32, 35 and 36; Fig. 2.24). These show a sedimentary succession that is similar to that at Hedgeley Quarry with up to 3.5m of bedded sandy gravels capped by up to 1m of fine silty sand alluvium (Fig 2.25). The T1 surface in this reach also exhibits numerous low-sinuosity palaeochannels with maximum channel widths ranging between *c.*25 and 35m (Fig. 2.24). Sediment cores from these T1 palaeochannels revealed infill sequences to comprise up to 1.5m of silt and sand overlying coarse gravels of the former channel bed; peaty silts at the base of a comparatively shallow fine-grained channel fill at site B19 has been dated to *c.*6440–6240 cal BC (Fig. 2.25; Appendix B).

Inset into the T1 terrace between Hedgeley Quarry and Beanley are several well-developed alluvial terrace scarps that delimit younger alluvial surfaces developed within a corridor up to 200m wide on either side of the present channel (Figs 2.24 and 2.25). Terrace scarps are often coincident with well-developed palaeochannels of higher sinuosity and narrower width (typically between 10 and 15m) than those characterising the T1 surface. Sediment coring

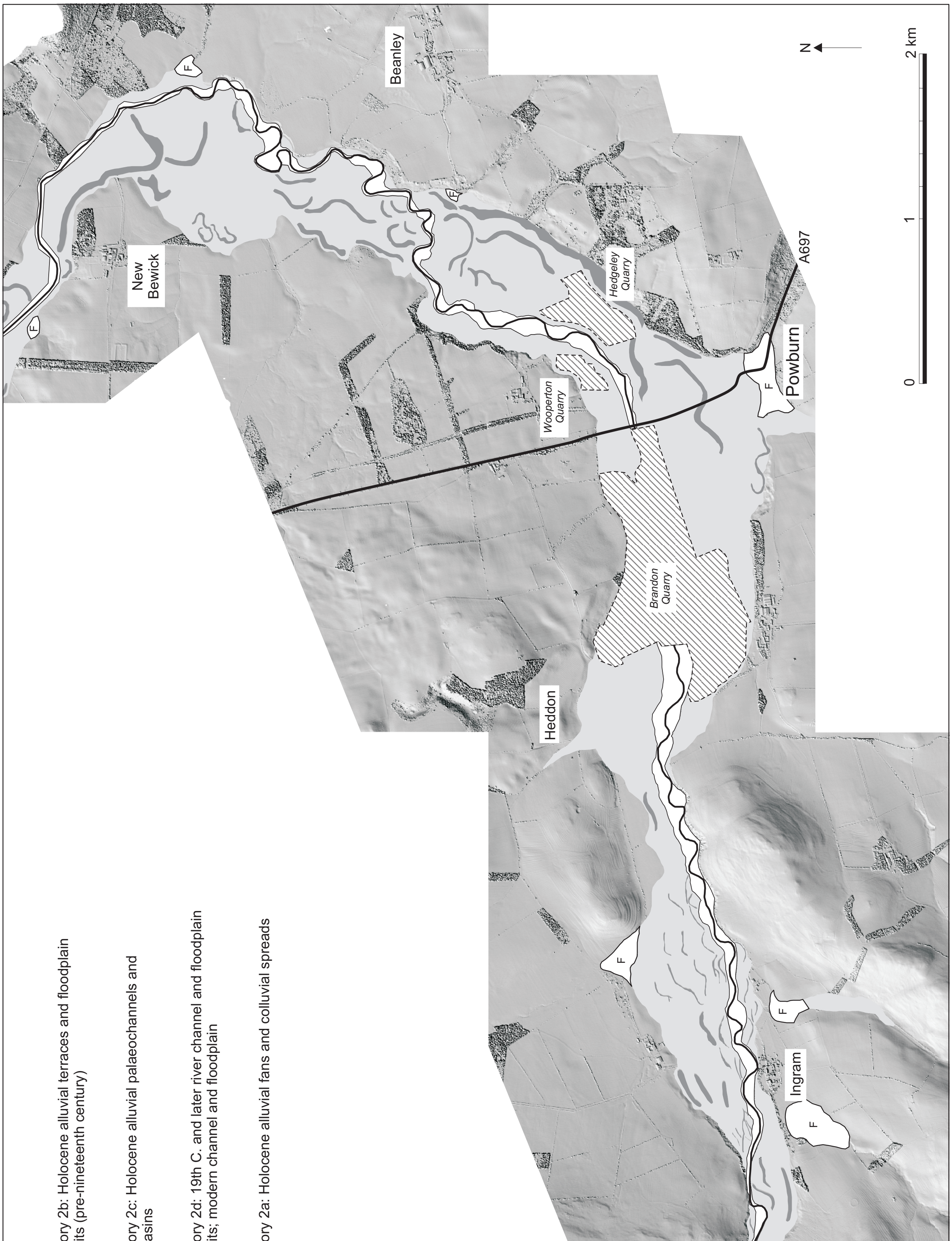


Fig. 2.21. LiDAR-derived digital elevation model of sub-reach Ingram-Powburn-Beanley showing Holocene landform elements.

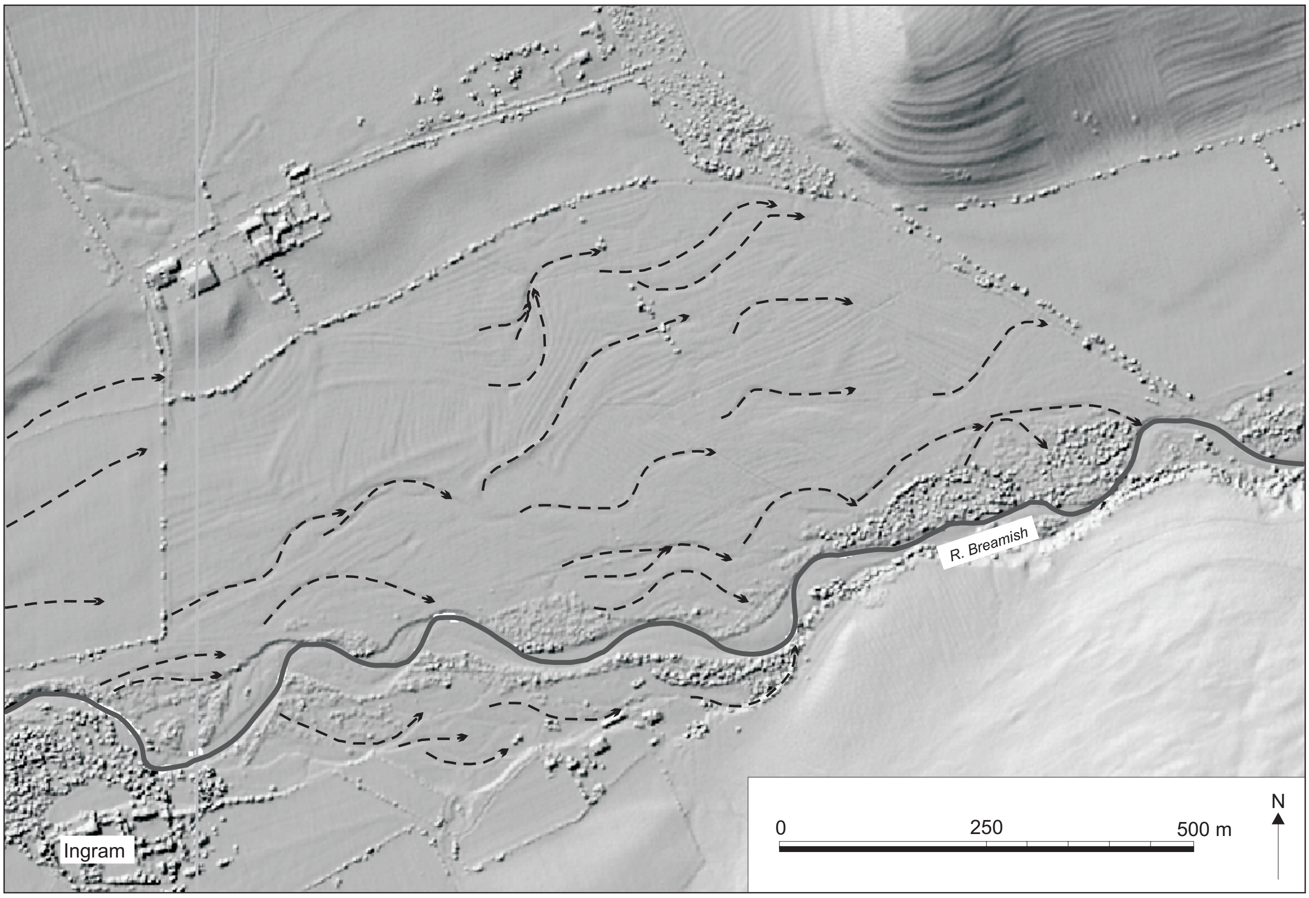


Fig. 2.22. LiDAR-derived digital elevation model of the valley floor and River Breamish at Ingram showing major palaeochannel courses and ridge and furrow field systems.

Fig. 2.23. Current aggregate extraction at Brandon Quarry (site location QP1-2; see Fig. 2.21, Appendix B and text for details).

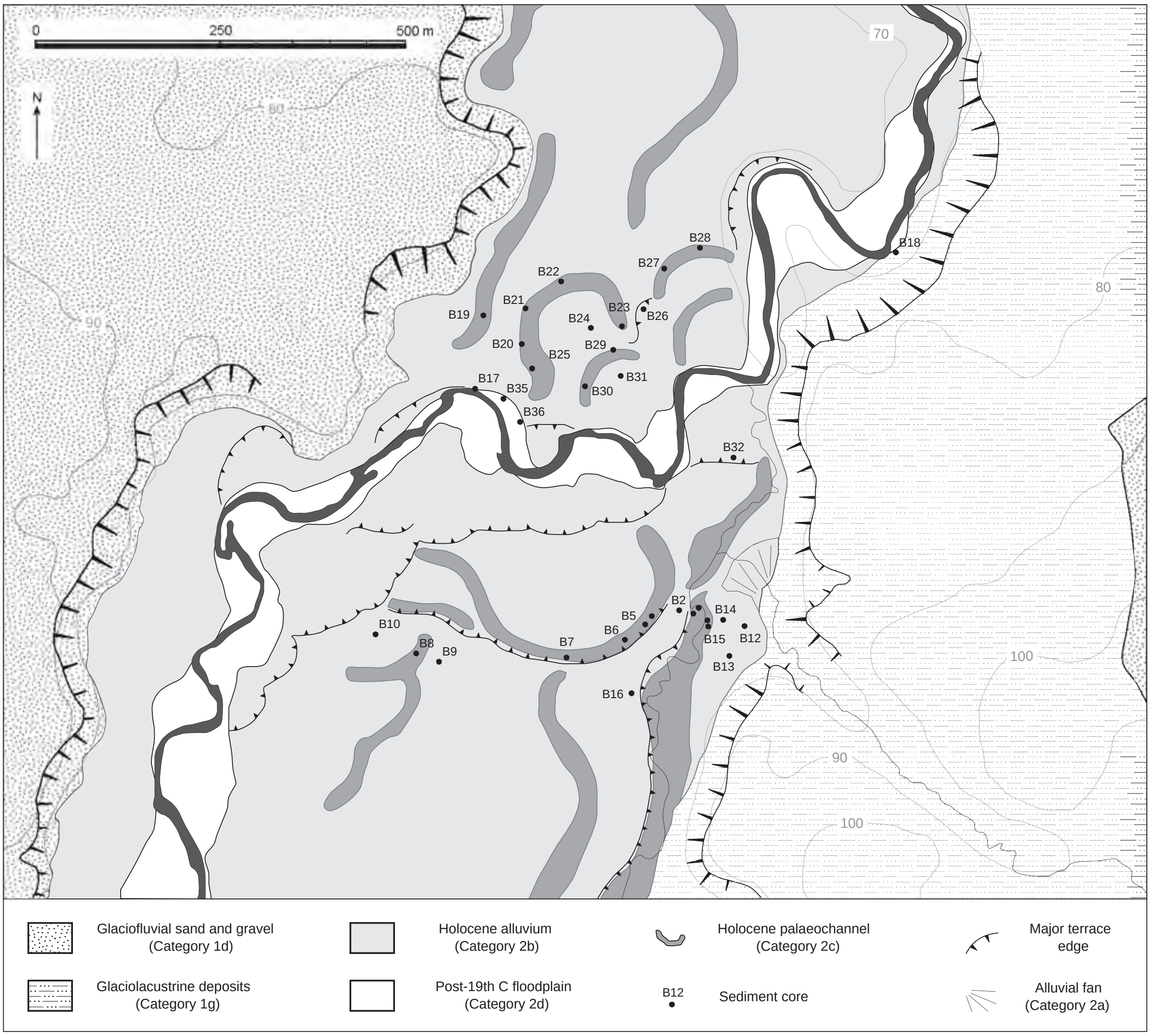


Fig. 2.24. Geomorphological map of the Holocene valley floor at Beanley (Breamish valley) showing major palaeochannels, terrace edges and sediment core locations.

of associated palaeochannels revealed channel fill deposits of up to 1.5m of fining-upward sequences of fine gravel, sand and silt with occasional beds of peat and silty clay lenses with wood and plant remains (Appendix B).

Two of these palaeochannel fills have been subjected to radiocarbon dating and palaeoecological analyses. At sediment core site B12, located on the eastern fringe of the valley floor (Fig. 2.24), 1.4m of organic-rich and peaty channel fill sediments overlie channel bed gravels and have been dated to *c*. cal AD 1420–1620 between 90 and 96cm, and *c*. cal AD 1680–1940 at 80cm (Fig. 2.26; Appendix B). A single pollen assemblage spanning 62–144cm reveals an open landscape with some scattered oak and hazel woodland, grassland and evidence of cereal production. Peak values of cereal-type pollen and associated ruderal taxa occur in the lower part of the sequence and suggest localised arable production concurrent with the later medieval and early post-medieval period. This activity was most probably focused on the nearby Late Devensian sand and gravel terraces to the east (Fig. 2.24). Aquatic pollen is relatively limited in the lower part of the sequence; this is consistent with the macrofossil record which is suggestive of an unvegetated oxbow lake environment (Fig. 2.26; Appendix B).

Sediment core B6 was extracted from a well-defined, sinuous palaeomeander 200m west of B12 with a 0.75m thick peaty fill that directly overlies channel-bed gravels. Basal peat from this site gave a date of cal AD 1160–1290 and indicates the channel was abandoned shortly before this time (Figs 2.24 and 2.26; Appendix B). Macrofossil assemblages from the lower part of the sequence indicate a wetland marsh-type habitat surrounded by a limited tree cover, while

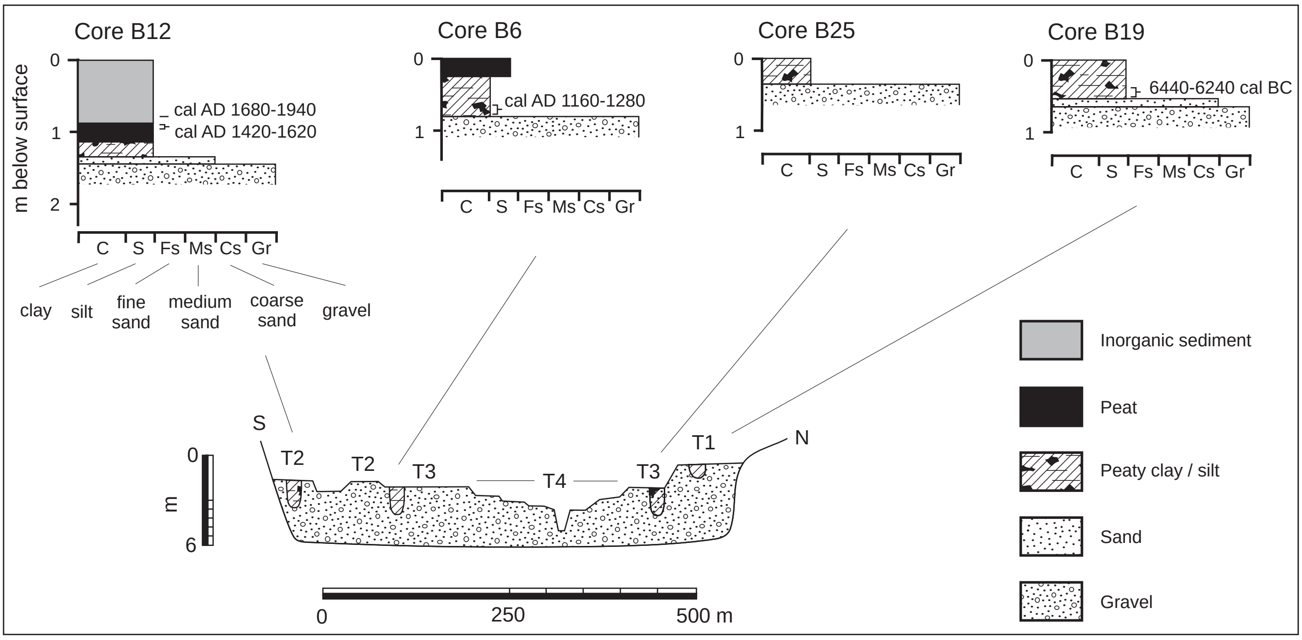


Fig. 2.25. Schematic cross-profile and sediment logs for the Breamish valley between Hedgeley Quarry and Beanley.

grassland species including Poaceae, *Potentilla erecta* and *Cerastium arvense* below 35cm are probably derived from drier floodplain and terrace environments in close proximity to the site (Fig. 2.26). Pollen data confirms the presence of open woodland and grassland in the locality for sediments below 30cm, while cereal grains are also recorded below 52cm. Analysis of insect fauna in this part of the record provides only limited interpretable information, although the presence of *Aphodius* is suggestive of local grassland and/or pasture (Fig. 2.26).

Summary of the Ingram-New Bewick fluvial history

Holocene valley fills in the Ingram-Powburn-Beanley reach are predominantly comprised of coarse sands and gravels capped with a thin (up to *c*.1m) fine unit. The highest terrace of the sequence, T1, is also the most extensive and most thickly developed; the maximum recorded thickness of gravels is 8m in the upper part of the reach, but the unit thins down-valley and appears to pinch out between Beanley and Harehope Hall. T1 deposits therefore form a wedge in the valley floor that buries a deeply incised cut through glaciolacustrine and glaciofluvial sediments. T1 gravels are interpreted as the deposits of a high-energy fluvial system with a laterally active and locally divided channel network. Buried fine sediment bodies infilling channel scours and the surface expression of low-sinuosity palaeochannels testify to widespread and frequent episodes of channel migration and avulsion.

Previous work in this reach of the Breamish has argued that the T1 gravels are Lateglacial glaciofluvial deposits (Clapperton 1971b) or are the deposits of a Holocene gravel bed river (Tipping 1992; 1994b). Investigations by Tipping (1992; 1994b) and this project have now documented radiocarbon dates for eight T1 palaeochannel fills (all in the upper 3m of the T1 gravel member) that give age estimates for local channel abandonment episodes at *c*.10,000 cal BC (Tipping 1992, 1994b – although it is acknowledged that this date may be giving an erroneously old age estimate hence should be treated with caution), *c*.6600 cal BC, *c*.4000 cal BC, *c*.1500 cal BC, *c*.800 cal BC, *c*.800 cal BC, *c*.150 cal BC and *c*.60 cal AD (Tipping 1994b). This broad date range indicates that the upper part of the T1 fill was associated with lateral channel shifts and reworking of channel and floodplain terrace deposits over the greater part of the Holocene up to the early medieval period. However, emplacement of the main gravel wedge is likely to have occurred during the Lateglacial period, following drainage of the Hedgeley Basin lake, and most probably reflects incision and reworking of extensive terraced glaciofluvial (Category 1d) deposits and Lateglacial alluvial fan systems (Category 1h) in the Ingram and Heddon/East Hill area (Fig. 2.21). Subsequent Holocene fluvial activity up to the early medieval period saw localised reworking of this gravel body with little or no net change in floodplain elevation.

Sometime during the period after cal AD 60–cal AD 390 and before cal AD 1160 there appears to have been a change in the fluvial regime that resulted in limited incision of the T1 terrace. River channel and floodplain development during medieval and later times has been focused on a relatively narrow, inset corridor that is most extensively developed in the distal part of the sand and gravel wedge 1.5–2.5km downstream of

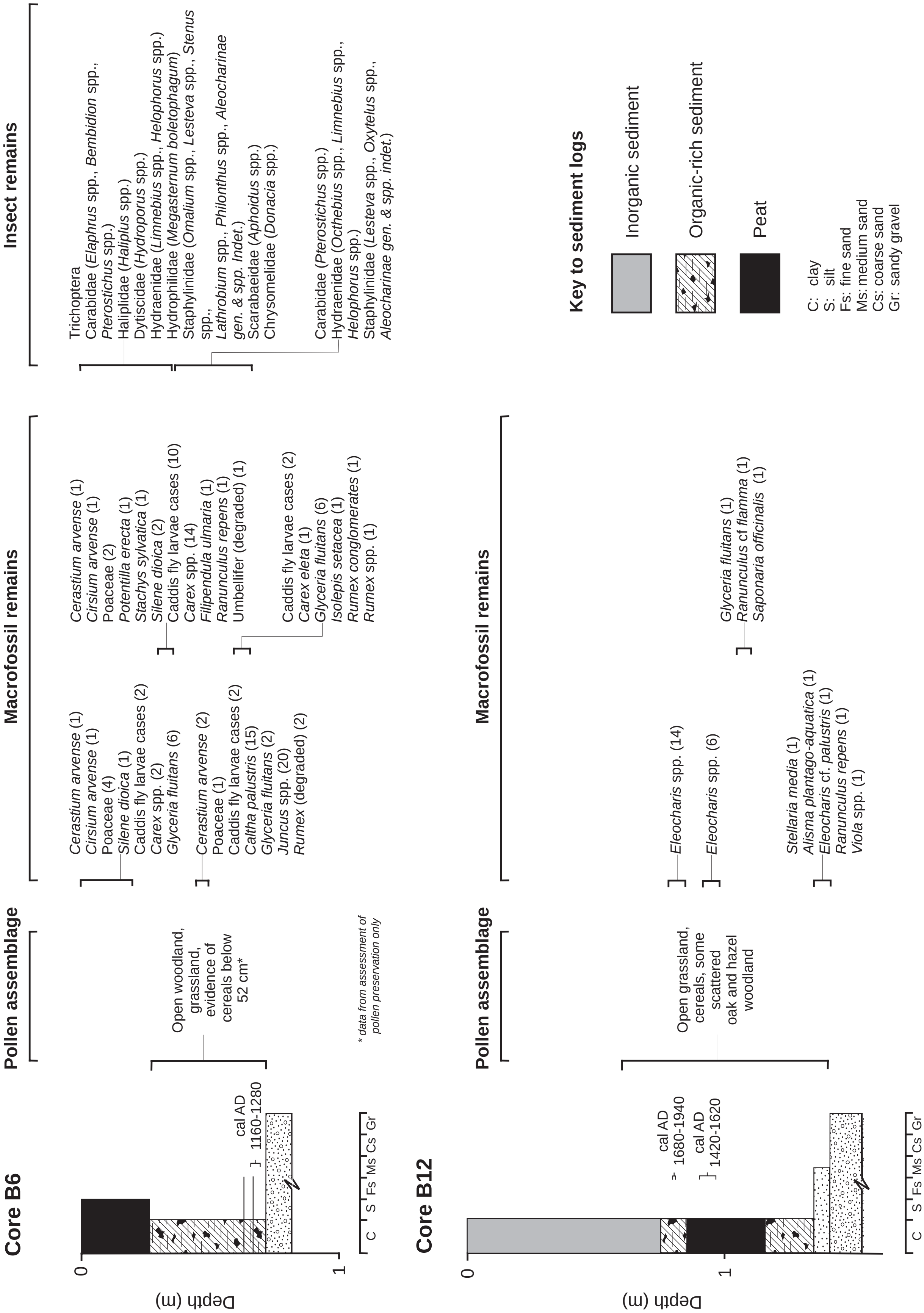


Fig. 2.26. Sediment log, ^{14}C dates and summary of pollen, plant macrofossil and insect assemblages for cores B6 and B12 near Beanley (Ingram-New Bewick sub-reach).

Hedgeley Quarry. Incision and terracing of the valley floor coincides with a change in prevailing channel planforms to a relatively high-sinuosity meandering river that experienced occasional avulsion and cut-off episodes; two cut-offs have been dated to the periods shortly before cal AD 1160–1290 and cal AD 1410–1620. The pattern of channel and floodplain development during and after the 19th century has continued to rework earlier fluvial deposits in a narrow zone flanking the present day river, although there does not appear to have been any net change in the elevation of channel and floodplain deposits.

2. Beanley-Weetwood (River Breamish/Till)

Between Beanley and Weetwood (valley km 10.5–27, Fig. 2.20) the middle reaches of the River Breamish/Till occupy a relatively narrow Holocene alluvial valley floor that is typically inset at least 5m below Late-glacial deposits and has well-defined margins (Fig. 2.27). Within this stretch of the river the Breamish is renamed the Till below Bewick Mill. From Chatton downstream to Weetwood, the Holocene valley floor is narrowly confined by glacial drift and a Fell Sandstone ridge immediately upstream of Weetwood. The present floodplain is up to 50m wide and located between early nineteenth century embankments where it lies inset up to 1.5m below the low-relief T1 terrace surface. Since the mid-nineteenth century there has been some limited incision and lateral channel shifts, particularly in confined sub-reaches. Canalisation of a 1.5km reach of the Breamish between New Bewick and Bewick Bridge has also necessitated artificial cut-off of several meander loops (Fig. 2.27). Present channel gradients decline from $0.0021m/m^{-1}$ in the upper part of the sub-reach to $0.001m/m^{-1}$ in the downvalley stretch between Chatton and Weetwood (Fig. 2.20).

Flanking the modern channel and embanked floodplain throughout the sub-reach is a low-relief Holocene floodplain terrace surface that infills small alluvial basins up to 0.6km wide which are separated by narrow, drift-confined reaches with little alluvial storage (Fig. 2.27). This alluvial surface grades to the T1 terrace surface at Beanley and forms the downvalley extension of this unit. Valley floor relief of the T1 surface between Beanley and Weetwood is subdued and features no distinctive alluvial terrace scarps that delimit alluvial surfaces of differing age. However, these surfaces locally feature high-sinuosity palaeochannels and palaeochannel scarps that are distant from present watercourses and which attest to changes in river channel location during the Holocene period.

Alluvial landform-sediment assemblages have been investigated at cut-bank sections and sediment cores in three representative sub-reaches at Bewick Bridge, Newtown Bridge and Chatton (Fig. 2.27).

Bewick Bridge

Investigations at Bewick Bridge have focused on three well-preserved and highly sinuous palaeomeanders of the Breamish and adjacent floodplain sediments located on the west side of the river upstream of the bridge (Fig. 2.28). Sediment coring of floodplain sediments found these to comprise an upper fine member of fining-upward, well sorted inorganic medium sands and massive silty sands up to 1.5m thick, overlying *c*.1.5m of bedded gravelly coarse to medium sand (Fig. 2.29). These sediments cap a basal coarse gravel member of indeterminate thickness that proved impenetrable by coring. The depth to contact with this gravel member varies between 2m to 3m across the valley floor (Fig. 2.29). All three palaeochannels were cored at the meander bend apex, respectively at sites BT1–2, 5 and 10 (Fig. 2.28) and found to be infilled with sandy, fine-grained organic-rich and/or peaty sediment sequences of up to 3m thickness (Fig. 2.29). Radiocarbon dates obtained from the base of these channel fills indicates that the channels were abandoned shortly before *c*. cal AD 390–600 (BT5), *c*. cal AD 680–940 (BT10) and *c*. cal AD 900–1160 (BT2; Fig. 2.29), respectively. In combination, these palaeochannels demonstrate localised shifts of the meandering gravel bed Breamish channel during the first and early second millennium AD. There is no evidence of scroll-bar formation on the terrace surface inside the palaeomeanders and hence channel shifts were probably accomplished by avulsion during one or more flood events. Avulsion occurred in the context of a vertically stable channel bed elevation, although overbank sedimentation of fine-grained alluvium will have aggraded the floodplain terrace surface during this period. The initiation of valley fill sedimentation in the study reach is currently undated, but it is assumed that alluviation began shortly after Late-glacial incision of the valley floor. Dated palaeochannels here would suggest that the greater part of the valley floor at Bewick Bridge dates from the post-Roman period onwards; however, it is acknowledged that palaeochannels of an earlier date may survive in wider parts of the valley floor.

Palaeoecological analyses undertaken on channel fill sediments are summarised in Figures 2.30 (BT5), 2.31 (BT10) and 2.32 (BT2) and, in combination, offer some insight into the local vegetation cover for intervals spanning the 5th–12th centuries AD (see Appendix B for a full description). Pollen assemblages in all three sedimentary sequences suggest that, for much of the past 1600 years or so, drier parts of the floodplain and adjacent glaciofluvial landsurfaces supported low levels of woodland cover in a largely open grassland landscape, and that the landscape was probably extensively deforested by the later medieval period. The woodland composition is similar at all three sites, being composed mainly of hazel, oak and, on wetter parts of the floodplain, stands of alder, while an increase

Fig. 2.27. LiDAR-derived digital elevation model of sub-reach New Bewick-Weetwood (Breamish/Till valley) showing Holocene landform elements.

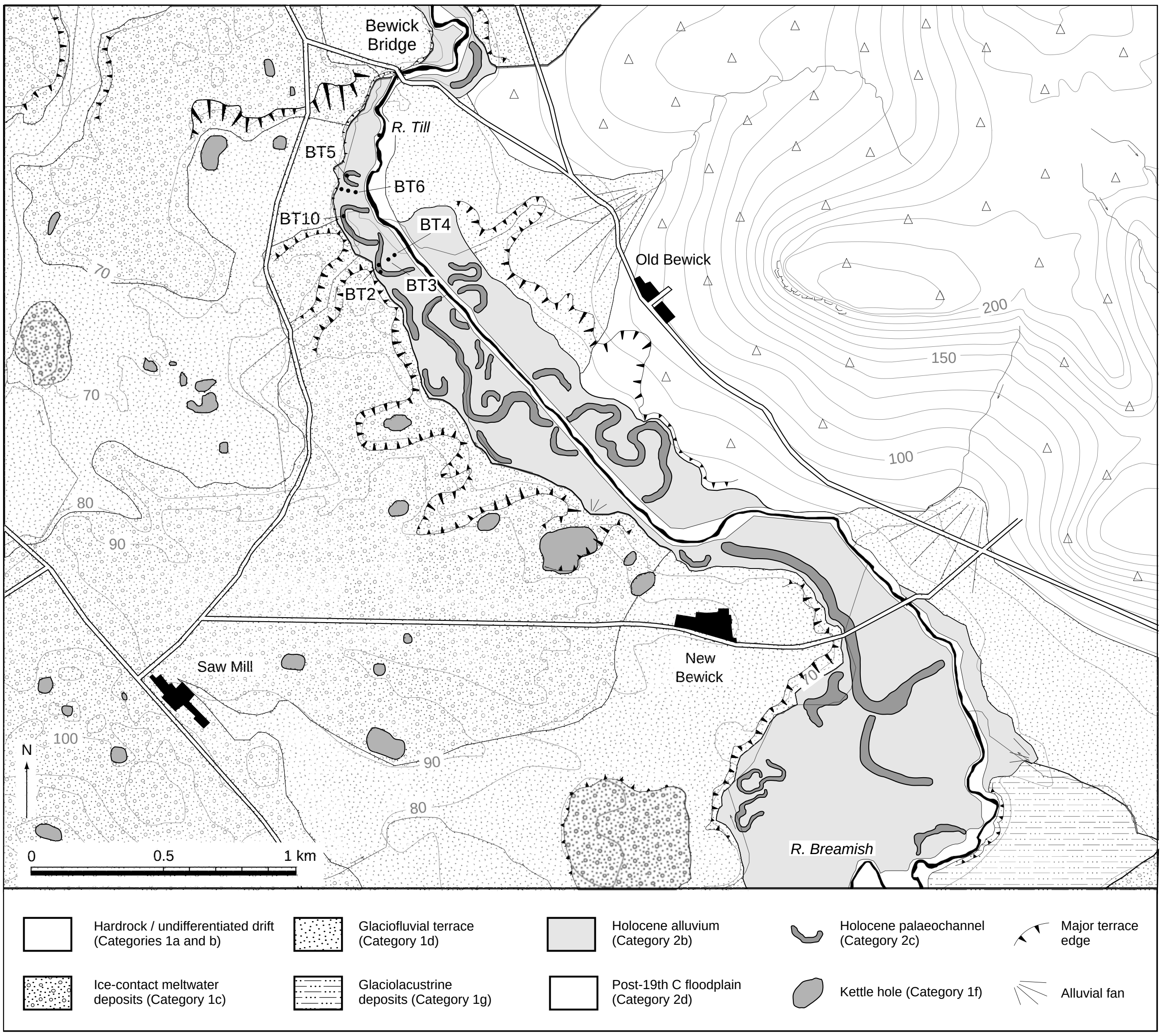


Fig. 2.28. Geomorphological map of the valley floor and Fell Sandstone escarpment at New Bewick showing major palaeochannels, kettle holes, terrace edges and sediment core locations.

in pine pollen in the upper part of each sequence is consistent with the medieval and later expansion of pine plantations. Gramineae dominate the herbaceous taxa at all sites, but there is also a significant presence of disturbance indicators such as Liguliflorae, *Plantago sp*. and Chenopodiaceae. These may, at least in part, reflect natural environmental disturbance associated with flooding, but the frequent presence of cereal pollen also points to localised and episodic arable cultivation from at least as early as cal AD 680–940 (BT10; Fig. 2.31), and subsequently around cal AD 900–1160 (BT2; Fig. 2.32). A local presence of grassland and pasture on the valley floor is also evidenced by the insect fauna assemblages. Local palaeochannel wetland conditions are indicated by quite significant levels of Cyperaceae, and the lower levels of all channel fills (especially BT20) feature relatively high counts of floodplain alder. This would suggest permanently damp conditions and may indicate a hydroseral succession to reedswamp associated with shallowing of floodplain ponds due to infilling and declining flood frequency. Plant macrofossils also testify to the existence of local floodplain pond and wetland/marsh habitats in palaeochannel depressions.

Newtown Bridge

Investigations at the Newtown sub-reach focused on a well-preserved palaeochannel that gently meanders for some 700m on the eastern valley side, together with adjacent floodplain and floodbasin sediments (Fig. 2.33). Both the palaeochannel and floodbasin depressions are partially overprinted by ridge and furrow field systems with furrow spacing at *c*.8–9m, and which are likely to date from medieval times

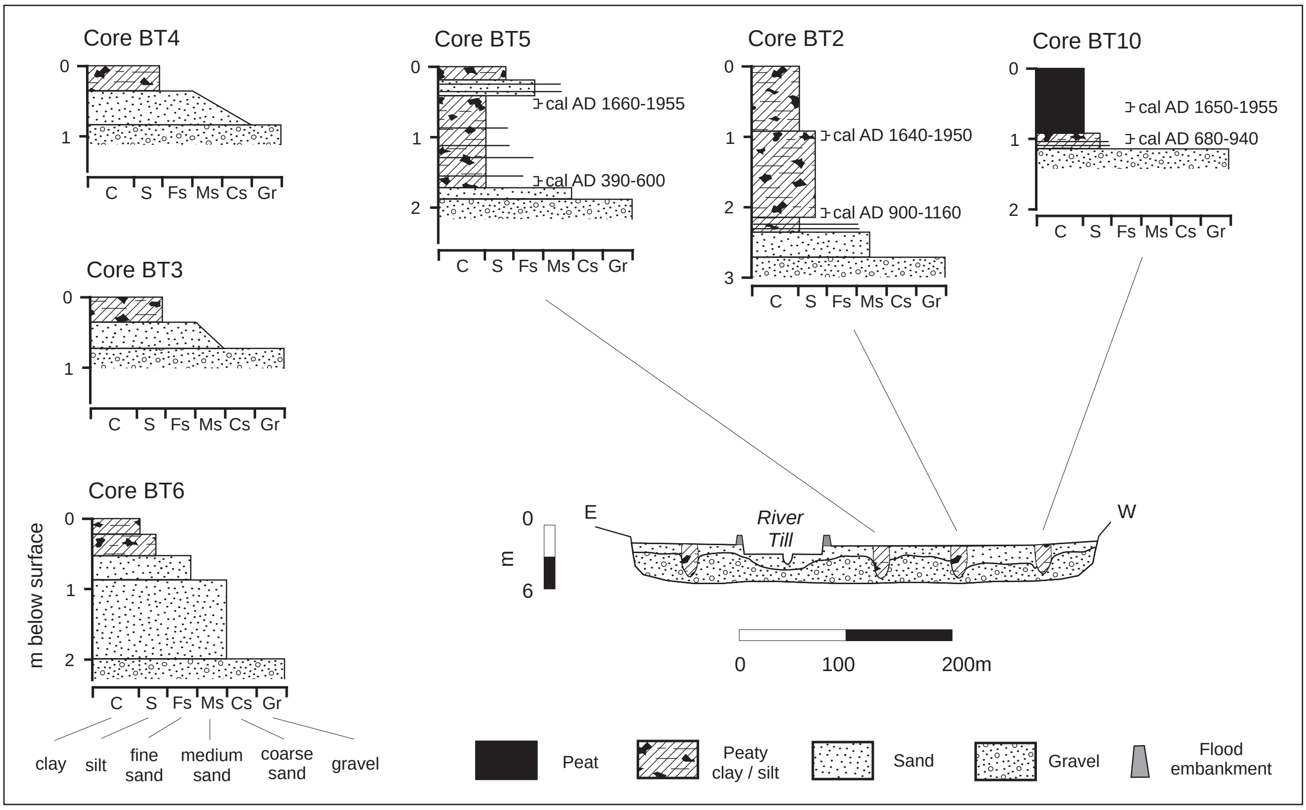


Fig. 2.29. Schematic cross-profile and sediment logs for the Holocene alluvial valley floor at Bewick Bridge (New Bewick-Weetwood sub-reach).

or later. Sediment coring of the floodplain surface revealed the valley fill to comprise fining-upward bedded coarse sands, massive silty sand and sandy silt up to 2m thick that overlie an impenetrable coarse gravel member (Appendix B). Fine-grained channel fill and floodbasin deposits reached a similar depth but sediments in these lower-energy depositional environments included occasional beds of organic-rich clayey silts and frequent macrofossil inclusions (Appendix B; Fig. 2.33).

Dating of channel abandonment and the beginning of infilling has been attempted by radiocarbon assays on wood, macrofossil inclusions and bulk peaty silt recovered from the base of channel fill sediments in two sediment cores spaced some 350m apart (cores BT18 and BT20; Appendix B; Fig. 2.33). Interpretation of the dates is problematic since both cores returned paired dates with statistically different ages (Appendix B); however, the older dates from each core lie within the same calibrated age-span of *c.* cal AD 770–1160. A younger (*c.* cal AD 1330–1660) age for channel abandonment is thought unlikely, given that overprinted field systems are likely to date from medieval times. Furthermore, the presence of a parish boundary line that tracks the modern river course suggests that there has been little channel movement in this particular stretch of the Till since the thirteenth century, by which time such boundaries had most probably been established (Kain and Oliver 2001). Accordingly, it is provisionally assumed that this channel was abandoned shortly after *c.* cal AD 770–1160 (Appendix B). Two radiocarbon assays on wood and macrofossil inclusions from the base of the floodbasin fill also returned differing age estimates of *c.* cal AD 1430–1620 and cal AD 1160–1280 (Appendix B). Here the older date is also preferred for the same reasons as noted above, but it is accepted that both estimates may be too young, possibly as a result of contamination during coring and/or agricultural disturbance.

Palaeoecological analyses of organic-rich fine sediment between 110 and 210cm in core BT20 indicate that the early stages of sediment accumulation in this cut-off during the later first millennium AD were associated with areas of open ponded water surrounded by alder carr (Fig. 2.34; Appendix B). In the upper part of the sequence, sometime after cal AD 1160–1280, a major local woodland clearance is signalled by declining arboreal pollen and a marked expansion of Gramineae with cereal-type pollen, which suggests that clearance occurred for agricultural purposes, including arable farming. Insect remains are also indicative of the close proximity of grassland and pasture, although the presence of macrofossils from aquatic and wetland plants in these levels indicates that a wetland habitat was sustained in the channel depression (Fig. 2.34; Appendix B).

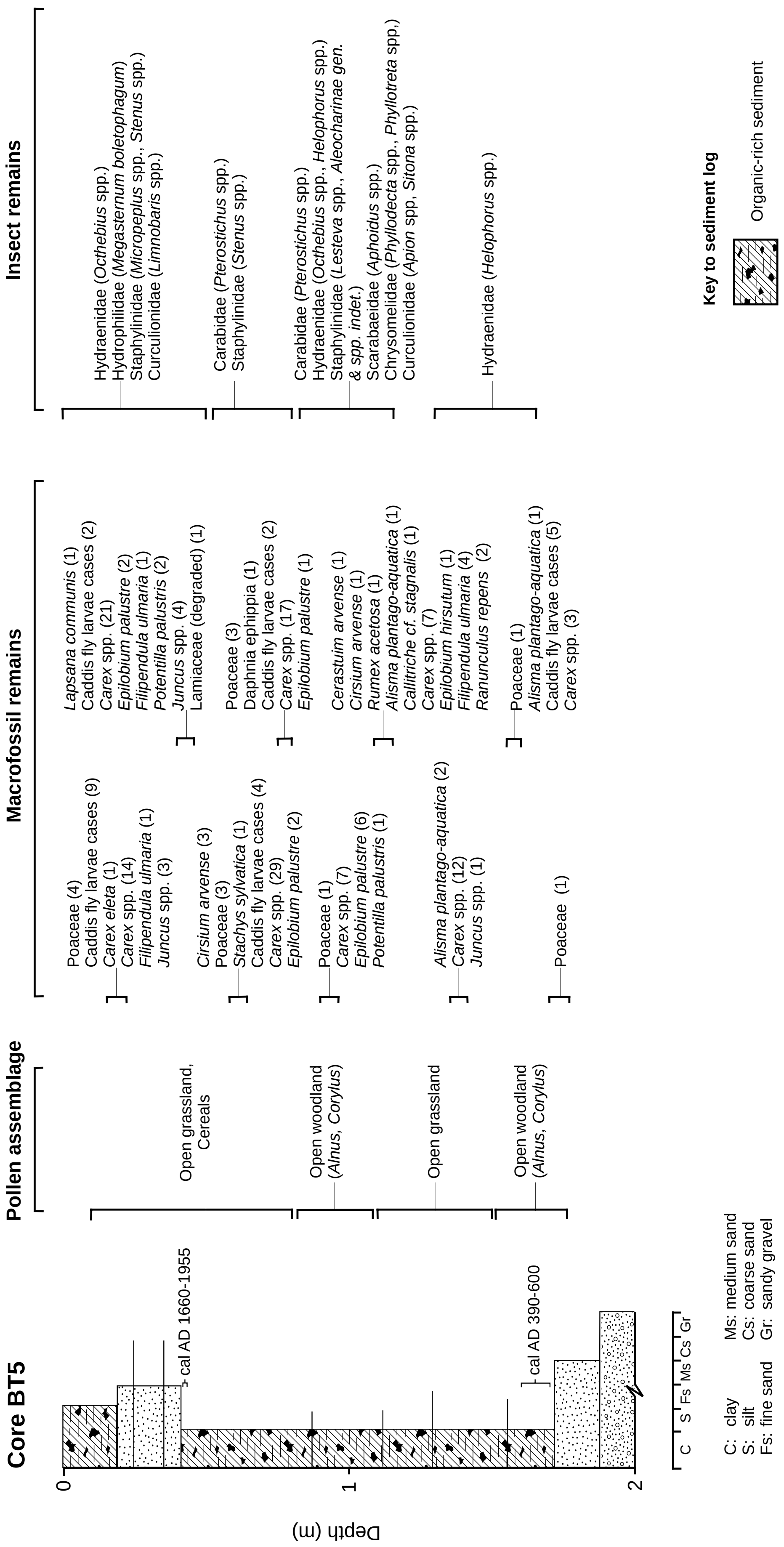


Fig. 2.30. Sediment log, ^{14}C dates and summary of pollen, plant macrofossil and insect assemblages for core BT5, Bewick Bridge (New Bewick-Weetwood sub-reach).

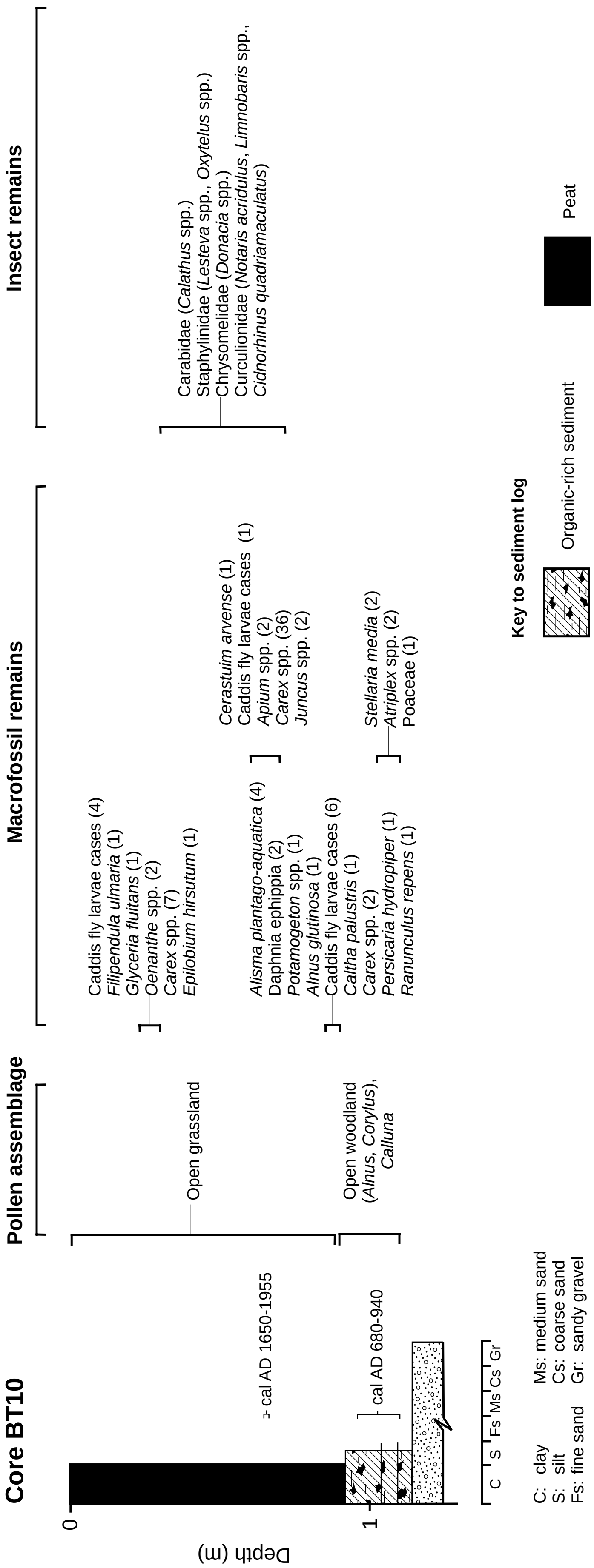


Fig. 2.31. Sediment log, ^{14}C dates and summary of pollen, plant macrofossil and insect assemblages for core BT10, Bewick Bridge (New Bewick-Weetwood sub-reach).

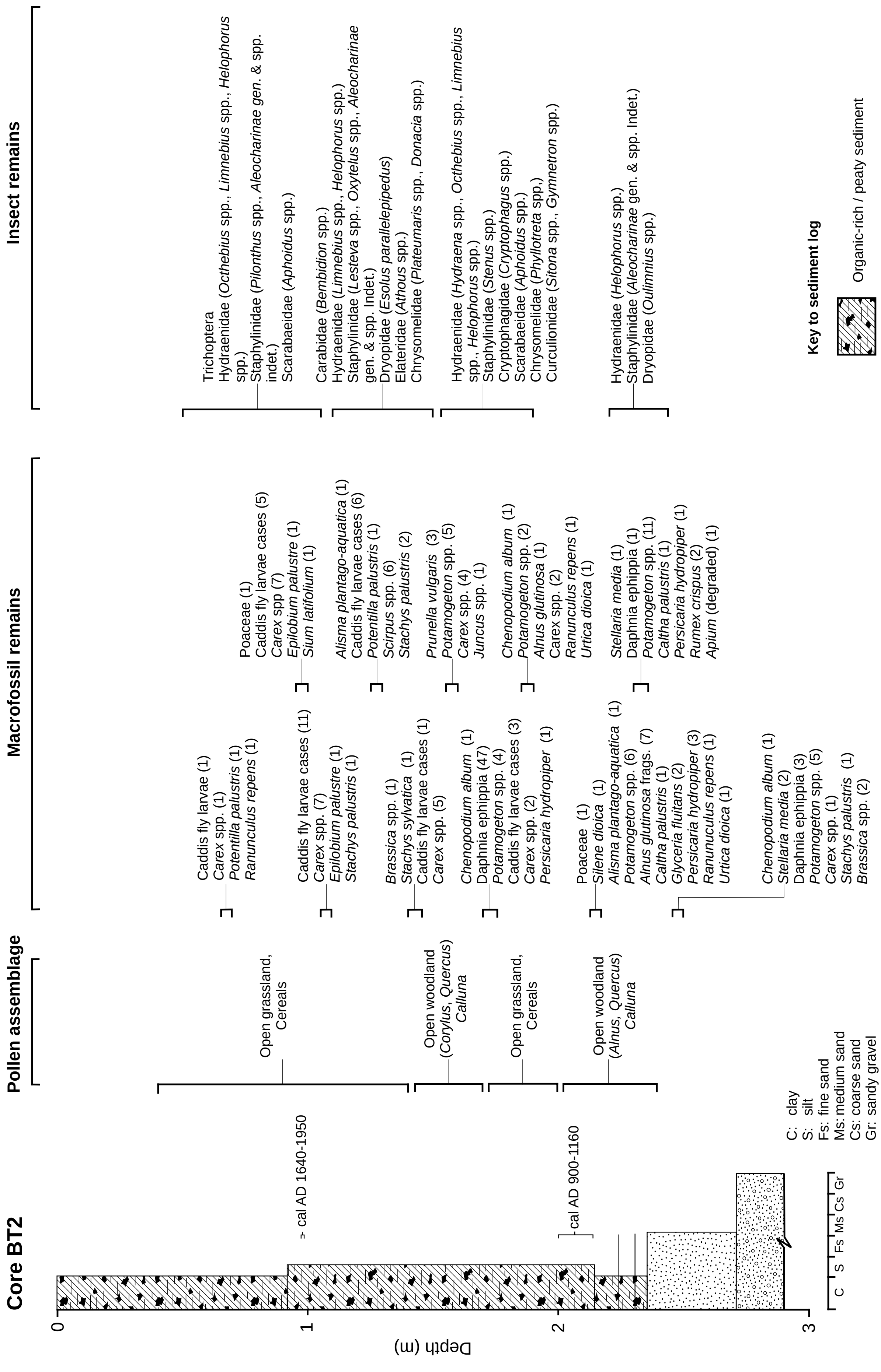


Fig. 2.32. Sediment log, ¹⁴C dates and summary of pollen, plant macrofossil and insect assemblages for core BT2, Bewick Bridge (New Bewick-Weetwood sub-reach).

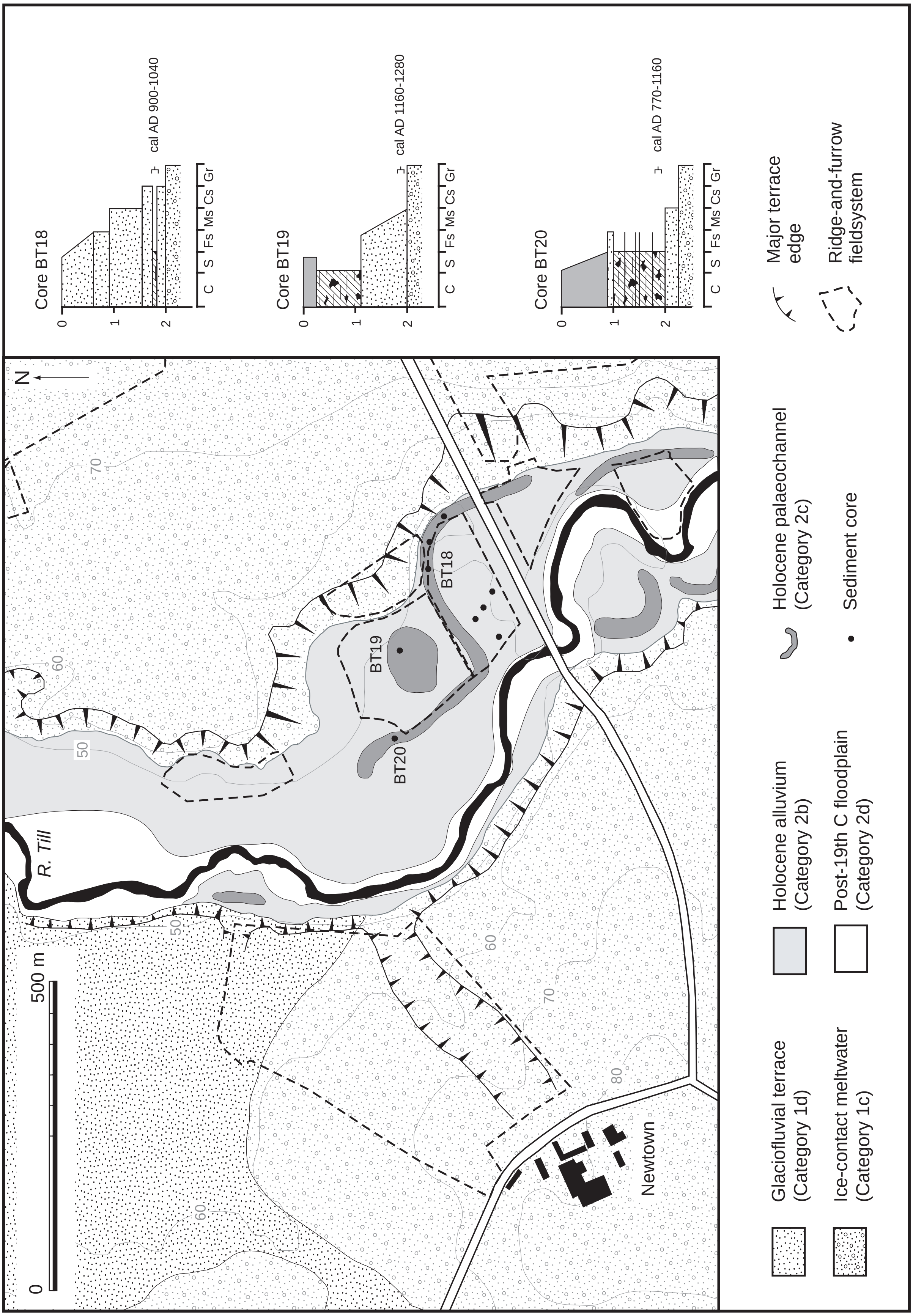


Fig. 2.33. Geomorphological map of the valley floor at Newtown Bridge (New Bewick-Weetwood sub-reach) showing major palaeochannels, archaeological features and sediment core locations. Also shown are selected sediment logs and ^{14}C *dates.*

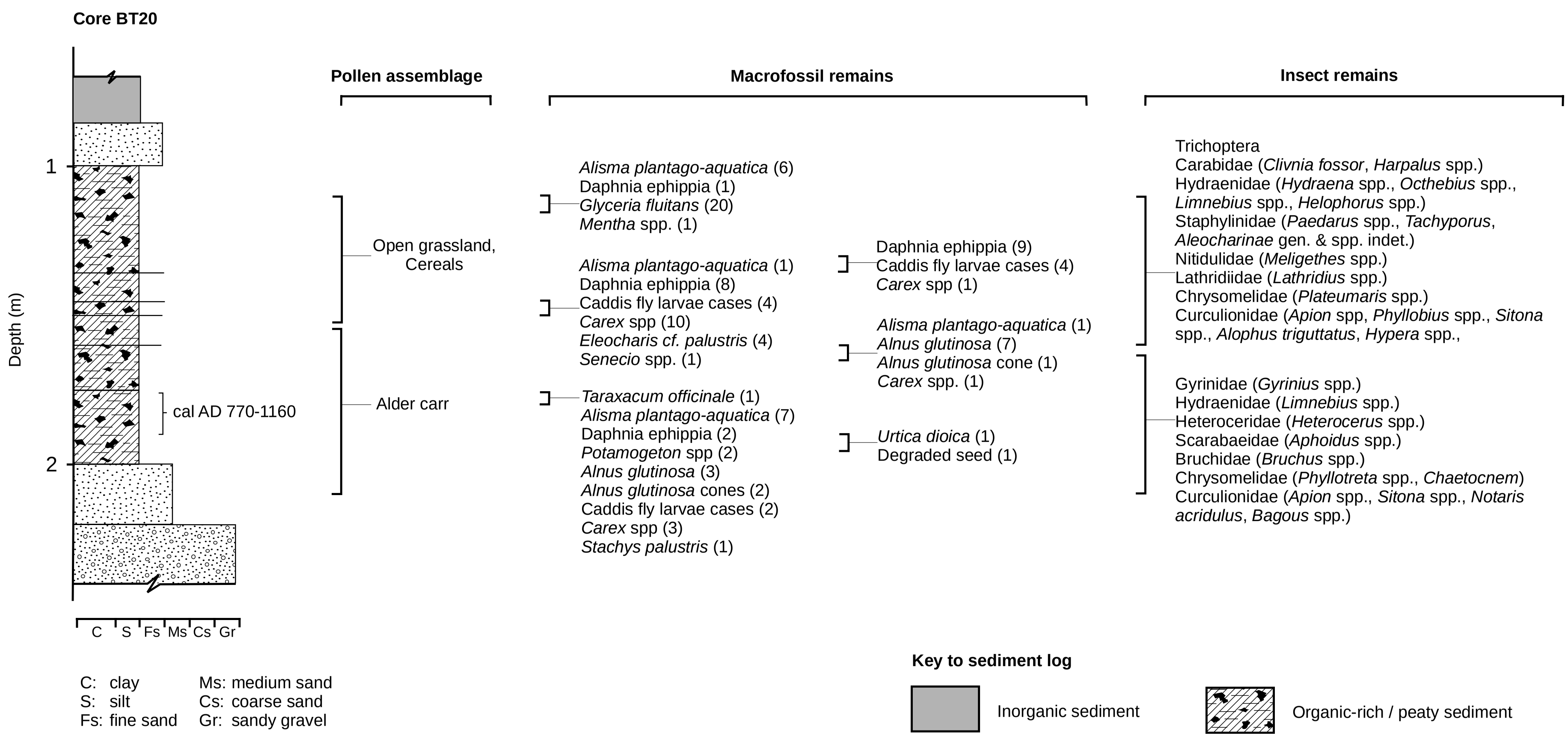


Fig. 2.34. Sediment log, ^{14}C date (see text for discussion) and summary of pollen, plant macrofossil and insect assemblages for core BT20, Newtown Bridge (New Bewick-Weetwood sub-reach).

Chatton

A low-relief Holocene alluvial valley floor with occasional palaeochannel and floodbasin depressions is also characteristic of a 2km stretch of the River Till downvalley from Chatton (Fig. 2.27). Channel and floodplain gradients here are lower than at New Bewick and Newton Bridge (Fig. 2.20; valley km 20–22) but, and despite the relatively low-energy river environment in this setting, no organic-rich sediments were observed in sediment cores through the alluvial floodplain sediments or channel fill deposits (Appendix B). Accordingly there have been no investigations of the chronology or palaeoecology of alluvial sequences in this sub-reach.

3. The Milfield Basin: Weetwood-Ewart-Doddington (River Till)

The River Till leaves its relatively confined valley floor at Weetwood and emerges into the broad expanse of Holocene alluvium infilling central parts of the Milfield Basin (Fig. 2.35). Between Weetwood and the confluence with the River Glen (valley km 27–32; Fig. 2.20), the Till has a gradient of 0.001m/m^{-1} (Fig. 2.20) and gently meanders along the north-east margins of the basin (Fig. 2.36). Prominent flood embankments built during the early nineteenth century (Archer 1992) confine the channels of the Till and the confluent Glen, Wooler Water and also the ditched Humbleton Burn, a minor tributary that joins the Till from the southern flanks of the Cheviots. Surface relief on the Holocene valley floor ranges between 34 and 36m O.D. and is generally subdued with no distinct breaks of slope that might suggest Holocene terrace formation. However, geomorphological mapping has identified numerous palaeochannel and occasionally floodbasin depressions that are most abundant in the vicinity of the present river channels (Fig. 2.35). The margins of the alluvial surface are locally well defined where they abut steep glaciodeltaic and glaciofluvial terrace bluffs, but elsewhere they gently onlap the lower margins of the lowest Lateglacial outwash fan terrace along the southern margin of the basin (and the associated gravel island immediately west of Bridge End), and the sloping margins of glaciolacustrine deposits to the east of the Till (Fig. 2.35).

Sedimentary sequences underlying the alluvial surface have been investigated along two coring transects. Transect MSH1 extends for some 2.7km between Bridge End and a small crossing over the River Till to the south-west of Doddington (Fig. 2.37; Appendix C). Selected sediment core logs and the surface profile of MSH1 are illustrated in Figure 2.38; this shows the alluvial surface to rise gently from a low of 34.5m OD at Humbleton Burn, in the central part of the basin, to 35–36m OD in the vicinity of the rivers Glen and Till, respectively on the west and east side of the valley floor. Transect MSH2 lies to the south of MSH1 and traverses low-lying glaciofluvial surfaces (Categories 1d and 1e) as well as Holocene alluvium flanking the River Glen to the west and the Till and Wooler Water to the east (Fig. 2.37).

Transects revealed Holocene alluvial sedimentary sequences to achieve depths between 200 and 500cm (Fig. 2.38; Appendix C) and overlie inorganic blue/pink, finely laminated fine sands, silts and clays that are consistent with accounts of glaciolacustrine deposits described by Clapperton (1971b) and Payton (1980; 1988). Alluvium typically comprises massive or poorly bedded and generally inorganic fine sandy silts, clays and silty fine sands deposited as overbank sediments; thicker deposits of coarse sands (occasionally with fine gravel inclusions), evident for example in cores MSH1–8, 9 and 13 (Fig. 2.38), probably reflect former channel bed and bar sediment associated with former courses of the Glen and/or Till (but which have no expression on the present alluvial surface). Lower parts of cores MSH1–2, 3, 19 and 21 also contain beds of peat and/or organic fine sands, silts and clays up to 50cm thick (Appendix C).

Sediment cores taken in the vicinity of Humbleton Burn in the central part of the basin (cores MSH1-1, 14 and 21, Fig. 2.38) are notable for featuring beds of peat and/or organic fine sands, silts and clays at depths between 250 and 350cm below the surface. These cores lie within a 50m stretch of the transect and the organic-rich sediments are interpreted as buried shallow channel fills or floodbasin depressions that have no modern surface expression. A radiocarbon assay of *c*.11,810–11,470 cal BC (11,740 years BP; Beta-125959) from peat obtained from core MSH1-14 at 291–299cm suggests this organic deposit dates to the Lateglacial (Windermere) Interstadial (Fig. 2.38; Appendix C). Pollen counts from sediments between 310 and 330cm in nearby core MSH1-21, characterised by a hazel-birch-juniper scrub (including the arctic-alpine dwarf-shrub *Betula nana* L.), grasses (Poaceae) and *Filipendula*, show a close resemblance to vegetation assemblages from very early Holocene deposits in the kettle hole fill at Lilburn South Steads, 9.7km to the south-east (Jones *et al*. 2000). Confirmation for this age estimate is currently problematic, however, since MSH1-21 has been radiocarbon dated to *c*.3640–3360 cal BC at 322cm (Appendix C). This date is believed to be in error as a result of sample contamination during the coring exercise, but clearly the interpretation of an early Holocene context for this deposit remains provisional, pending further palaeoecological and radiocarbon analysis.

Peaty and organic-rich silty clays are also evident between 200 and 400cm in core MSH1-19, located at the western end of transect MSH1 near the present channel of the River Glen (Figs 2.38 and 2.39), and in core MSH2-22 located some 0.7km south-west of Doddington Bridge (Fig. 2.37). Core MSH1-19 has been dated to *c*.4050–3950 cal BC at 396cm, at the base of a pollen sequence spanning sediments between 400

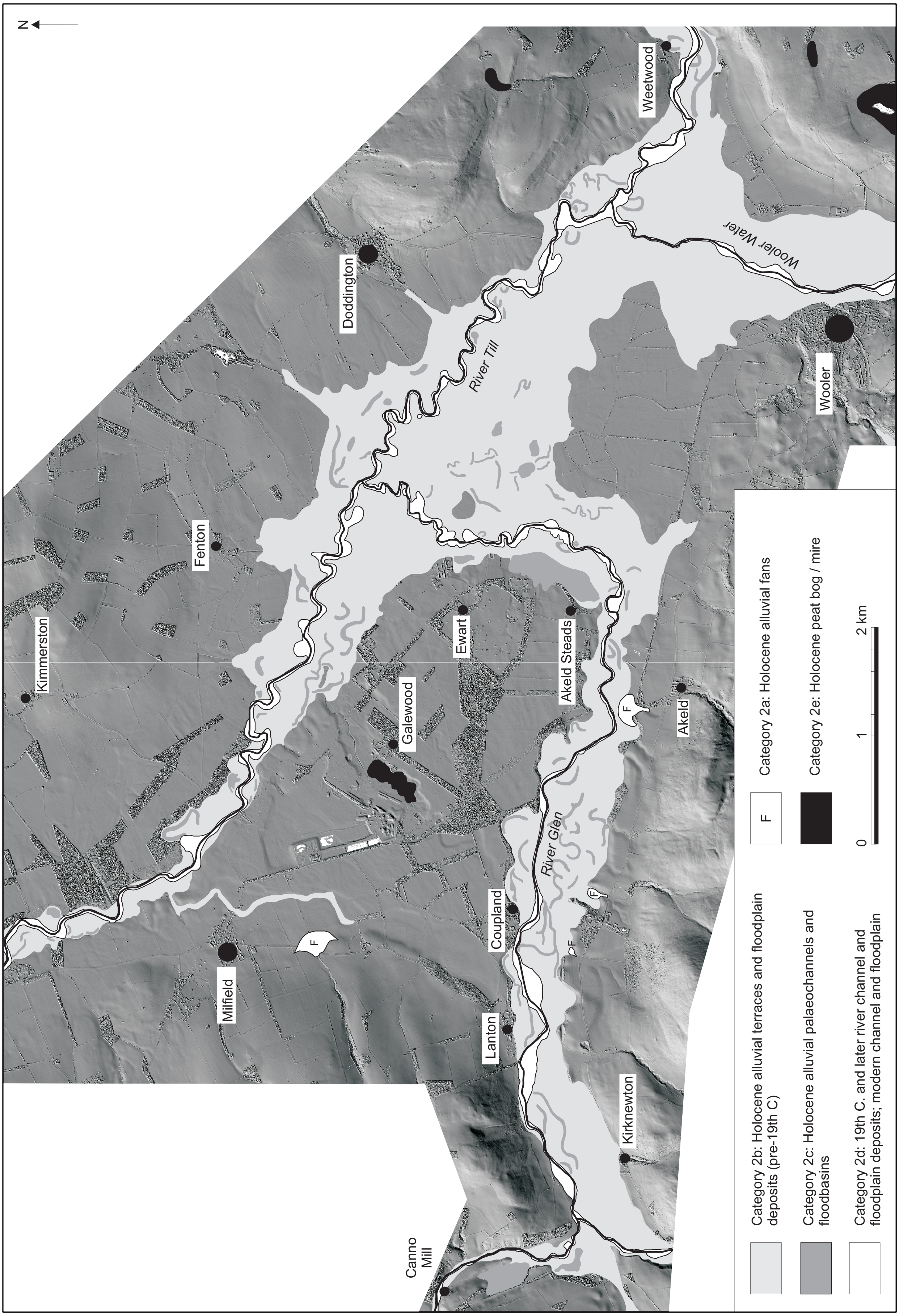


Fig. 2.35. LiDAR-derived digital elevation model of the Milfield Basin showing Holocene landform elements.

Fig. 2.36. View of the Milfield Basin looking west from Dod Law hillfort.

and 200cm (Fig. 2.39; Appendix C). The sequence begins at the onset of the Neolithic period (*c*.4050–3950 cal BC) and is dominated by a mixed woodland cover with patches of cleared grassland and pasture. Mixed oak woodland with elm, lime and ash is likely to have developed on drier parts of the alluvial valley floor and adjacent glaciodeltaic terrace, while floodplain wetland at the core site supported a well-developed alder carr. Woodland cover diminishes up-profile so that by the end of the pollen sequence at 200cm, the landscape exhibits a mix of open woodland with extensive areas of grassland and pasture. This trend is episodic, however, and punctuated by phases of woodland regeneration between 300 and 240cm before a marked decline commencing immediately thereafter. Woodland clearance throughout the profile is mirrored by pollen species reflecting grazing, hay cutting and arable cultivation, with cereal-type pollen appearing at 365cm sometime shortly after the beginning of the Neolithic period. However, establishing the chronology of clearance and associated human activity must await a full programme of radiocarbon dating. At core site MSH2-22, peat and peaty silts reached a thickness of 40cm below 125cm of inorganic alluvial silty clay and yielded overlapping dates on humic acid and humin fractions from basal peats in the range *c*. cal AD 240–420 (Appendix C).

Palaeochannel and floodbasin deposits

Palaeochannel and floodbasin deposits have been investigated at several locations across the central part of the Milfield Basin where they have surface expression as shallow depressions (Fig. 2.37). These sequences have yielded dated organic-rich sediments and/or palaeoecological data that collectively span much of the prehistoric and early historic period, and also extend locally into Lateglacial times. The most extensive and temporally continuous sequence has been documented by Borek (1975) and Tipping (1994a; 1998) at Akeld Steads; here up to 4m of peat and interbedded fine-grained alluvium locally infill a floodbasin depression lying immediately adjacent to the glaciodeltaic terrace margin, and span the onset of the Holocene period up to *c*.950 cal BC (Fig. 2.37; 2.40). Geomorphological mapping and sediment coring undertaken for this project has demonstrated that this floodbasin extends for some 800m along the terrace margin and has a laterally persistent peaty infill sequence between 345 and 120cm thick (Appendix C). In the downstream limits of the floodbasin these peaty sediments directly overlie blue/grey finely laminated sands, silts and clays to a recorded depth of 200cm, and which are interpreted as glaciolacustrine deposits that have been previously described in this area by Payton (1980). Borek's (1975) pollen diagram from

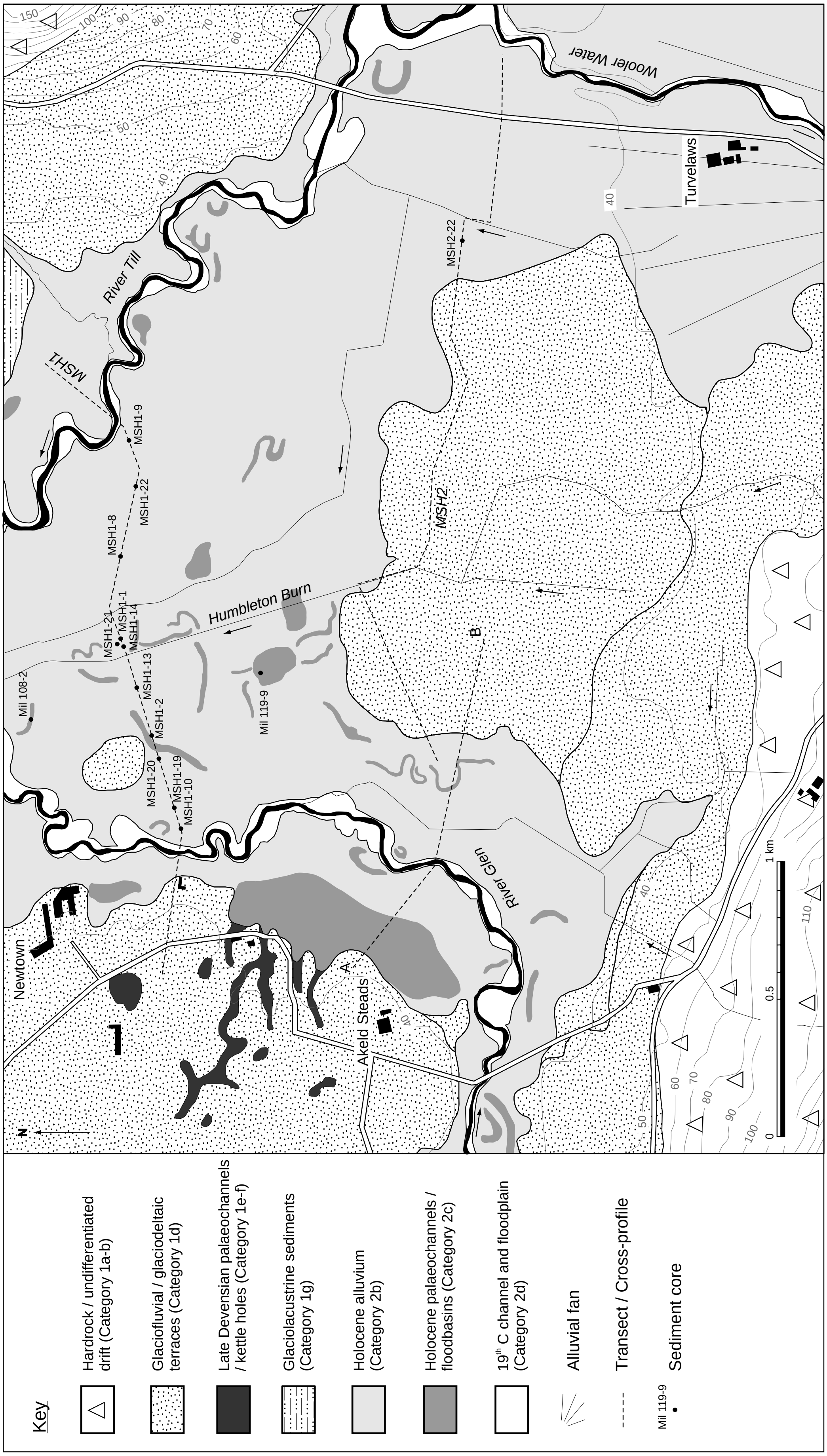


Fig. 2.37. Geomorphological map of the valley floor between Akeld Steads and Turvelaws (Milfield Basin) showing transects MSH1 and MSH2, cross-profile A-B, major palaeochannels and selected sediment core locations.

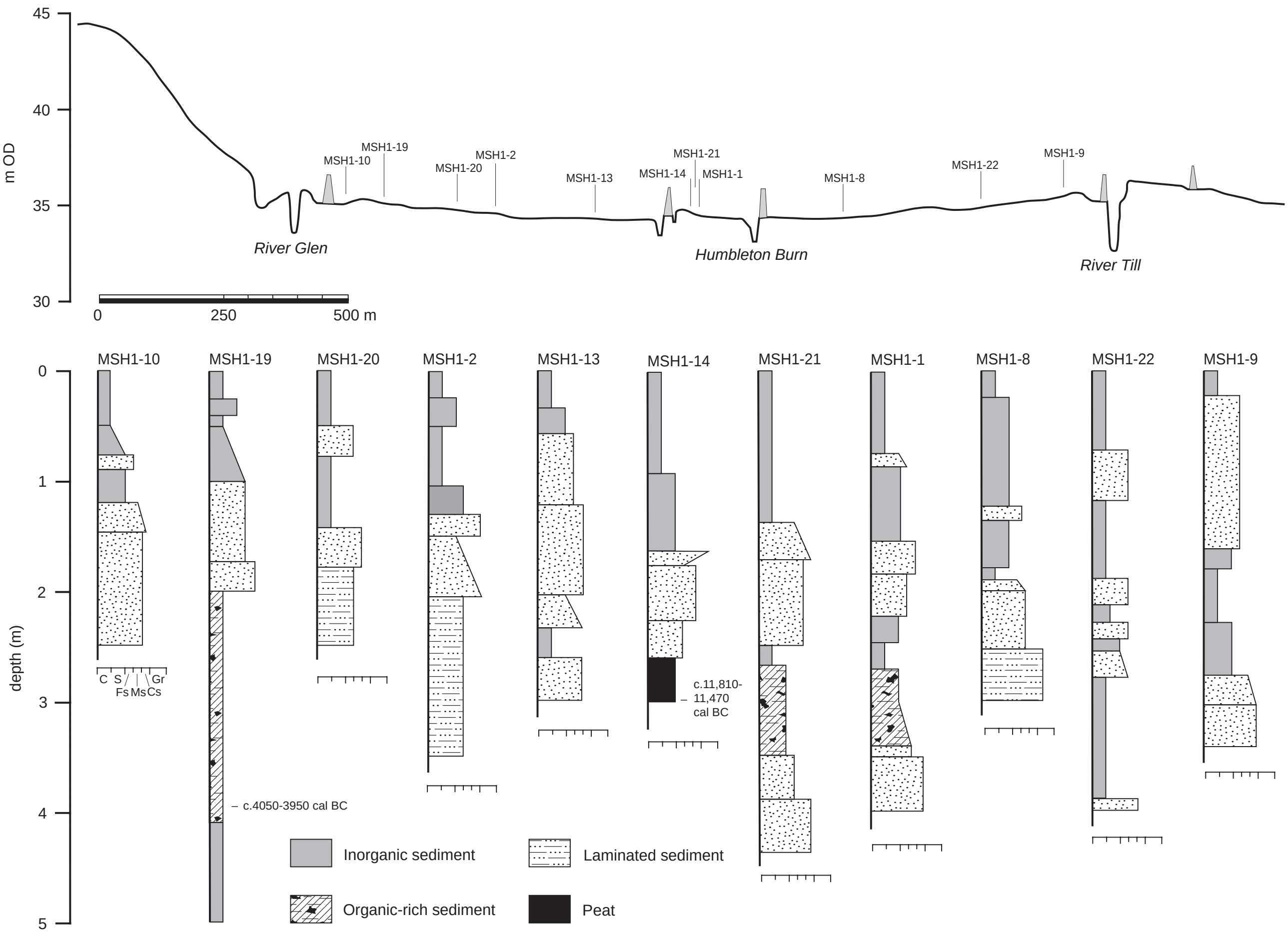


Fig. 2.38. Cross profile of the valley floor of the Milfield Basin along Transect MSH1 (derived from LiDAR data) showing locations and logs of selected sediment cores. For Transect location see Fig. 2.37.

the Akeld Steads sequence has been augmented by a radiocarbon dating programme by Tipping (1998), and in combination these analyses record the development of a local wetland and surrounding floodplain woodland that from *c.*7400 cal BC is dominated by alder. Fluctuations in alder cover during the Middle Holocene coincide with flood sediment deposition and are interpreted as flood-induced disturbance, and it is not until the Middle to Late Bronze Age that the pollen record indicates an expansion of grassland that may reflect local human activity (Tipping 1998).

Localised deposits of buried peat and organic-rich silts and clays up to 90cm thick are also present in a poorly defined floodbasin depression west of Humbleton Burn (Fig. 2.37; Appendix C). In sediment core Mil 119-9 these deposits span 195–285 cm and have been dated at 248cm to *c.*3970–3790 cal BC (Fig. 2.39; Appendix C). Pollen records from the lower part of this sequence, deposited before *c.*3970–3790 cal BC, are characterised by a hazel-dominated woodland cover with evidence of small-scale clearance. This assemblage is succeeded by development of mixed oak/hazel woodland, alder carr in the vicinity of the floodplain wetland and some small-scale pastoral land use (Fig. 2.39). Grasses (Poaceae), ruderal pollen and a cereal grain from the lower pollen assemblage suggest that the clearance may have been associated with Early Neolithic human activity rather than flood disturbance and possibly included a short-lived episode of arable cultivation. This evidence provisionally points to an earlier trace of human subsistence activity than that recorded by Borek (1975) and Tipping (1998) at Akeld Steads, but it does correspond well to the palaeoenvironmental record from core MSH1-19 some 500m to the north-west (see above).

The final dated alluvial pollen sequence from this part of the Milfield Basin is from a palaeochannel located in the lower reaches of the River Glen some 800m above the confluence with the Till (Core Mil108-2, Fig. 2.39; Appendix C). Channel fill sediments here include organic-rich silts and clays between 225 and 140cm that overlie coarse sands and gravels of the former channel bed (Fig. 2.39). A radiocarbon date of *c.* cal AD 80–320 was obtained from the humic and humin acid fractions of bulk organic sediment at 220cm (Appendix C) and provides a maximum age for

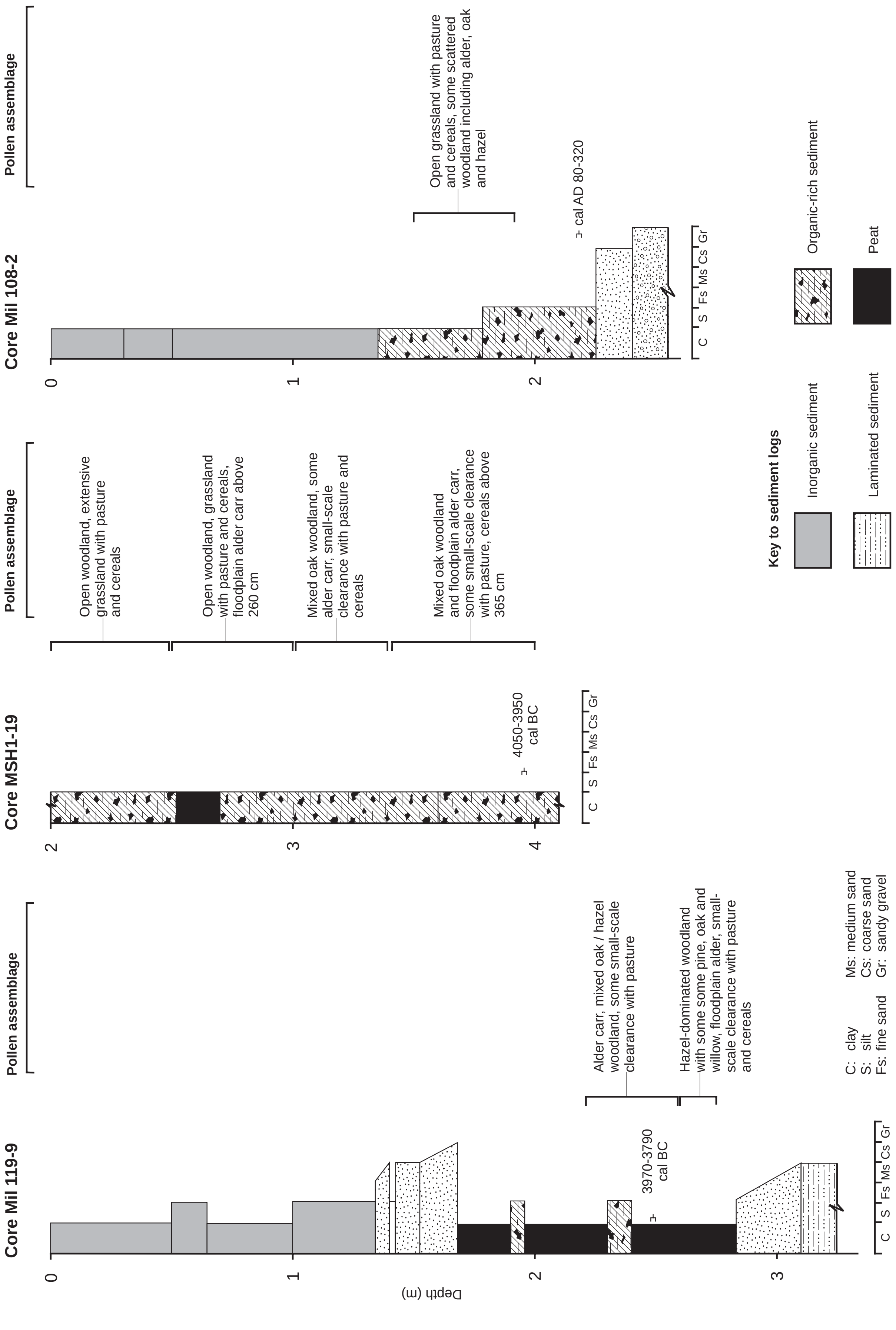


Fig. 2.39. Sediment logs, ^{14}C dates and summary of pollen assemblages for cores MSH1-19, Mil 108-2 and Mil 119-9, Milfield Basin.

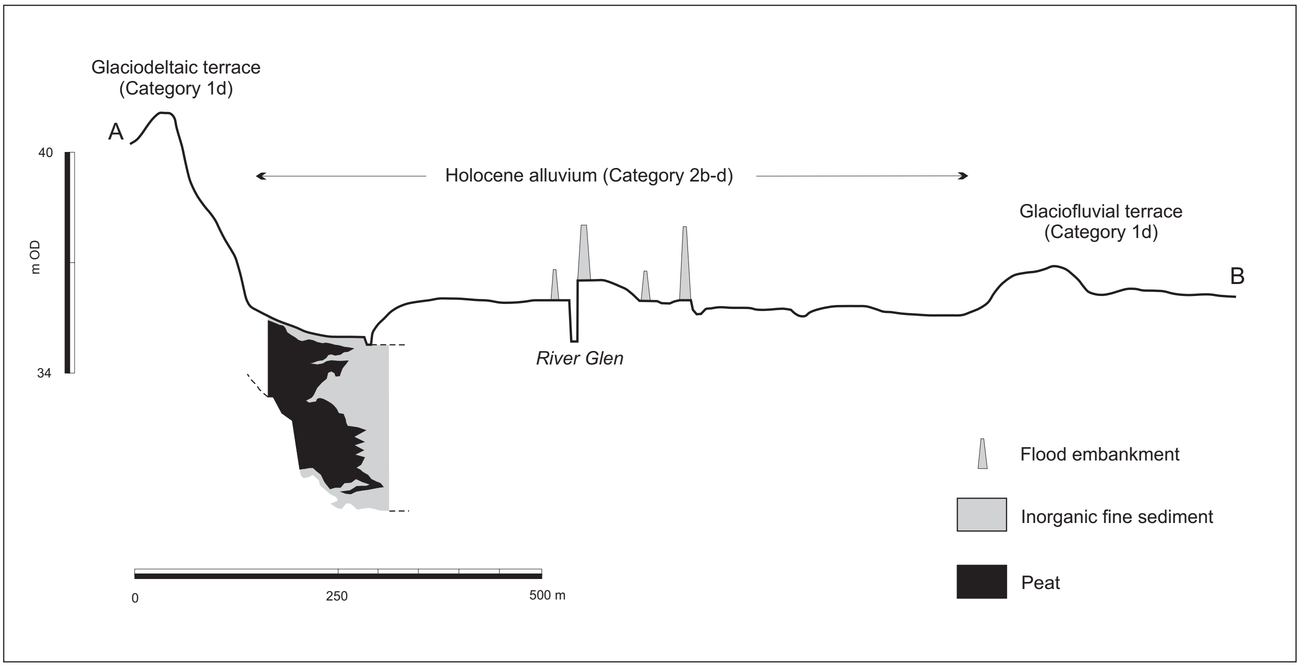


Fig. 2.40. Cross profile A–B of the valley floor of the Milfield Basin extending southeast from Akeld Steads showing a summary of the Holocene sedimentary sequence described by Tipping (1994a; 1998). For cross-profile location see Fig. 2.37.

the pollen assemblage spanning 192–152cm (Fig. 2.39). The pollen record suggests that shortly after *c*. cal AD 80–320 the palaeochannel formed a small floodplain wetland surrounded by hay meadows, grassland and cereal plots amidst some scattered woodland (Appendix C).

4. River Glen and Wooler Water

River Glen

The River Glen enters the study area immediately upstream of the confluence with the tributary College Burn before flowing east and entering the Milfield Basin at Akeld Steads (Fig. 2.35). Between the College Burn confluence and Akeld Steads the gravel bed River Glen occupies an alluvial valley floor 0.5km wide (Figs 2.35 and 2.41). The present river has a low-sinuosity, single-thread channel, but historic O.S. maps show that during the mid-late 19th century the channel was locally divided around small gravel islands in the reach immediately upstream of Lanton. Holocene valley floor relief is subdued with no evidence of terrace edges; indeed, cross-profiles indicate that the alluvial surface elevations generally lie within a range of 1m and rise gently from the valley margins towards the modern channel (Fig. 2.42). However, shallow palaeochannel depressions with meandering planforms are well developed in the reach between Lanton and the A697 road crossing (Fig. 2.41). Sediment cores in discrete channel depressions at sites M253-1, M253-3, M256-1 and M258-1 (Fig. 2.43) have shown fine-grained palaeochannel fill sediments to reach a depositional thickness of between 1 and 2m. All cores exhibit peaty and organic-rich fine sandy silts in their lower levels where they overlie coarse sandy gravels that represent former channel bed deposits (Fig. 2.43). Single radiocarbon assays from the base of each channel fill sequence have yielded calibrated dates that suggest all channels were abandoned at or shortly after the beginning of the 15th century AD (Fig. 2.43; Appendix C).

Calibrated date ranges for basal radiocarbon assays in cores M253-1 and M256-1 show a strong degree of overlap that is centred on the period cal AD 1400–1450 (Appendix C), and suggest that these channel fragments are broadly contemporary. Both channel fill sequences also show a good degree of correspondence in their pollen assemblages; these begin at the dated levels and are characteristic of a predominantly open landscape of grassland, fallow land and arable fields (Fig. 2.43; Appendix C). Livestock grazing and hay meadows appear to have been a significant component of the local land use activity, while pollen counts of *Secale cereale* (rye) are consistently at levels suggestive of cereal cultivation in the vicinity of the core sites. Associated woodland clearance appears to have reduced the tree cover to scatters of mainly hazel and birch with patches of alder along riverbanks and fringing floodplain wetlands (Appendix C).

Sediment cores M253-3 and M258-1 have basal radiocarbon dates that also share a significantly overlapping calibrated date range, although these span a longer period than those from M253-1 and M256-1 (Appendix C) and suggest a slightly later date for channel abandonment sometime between cal AD

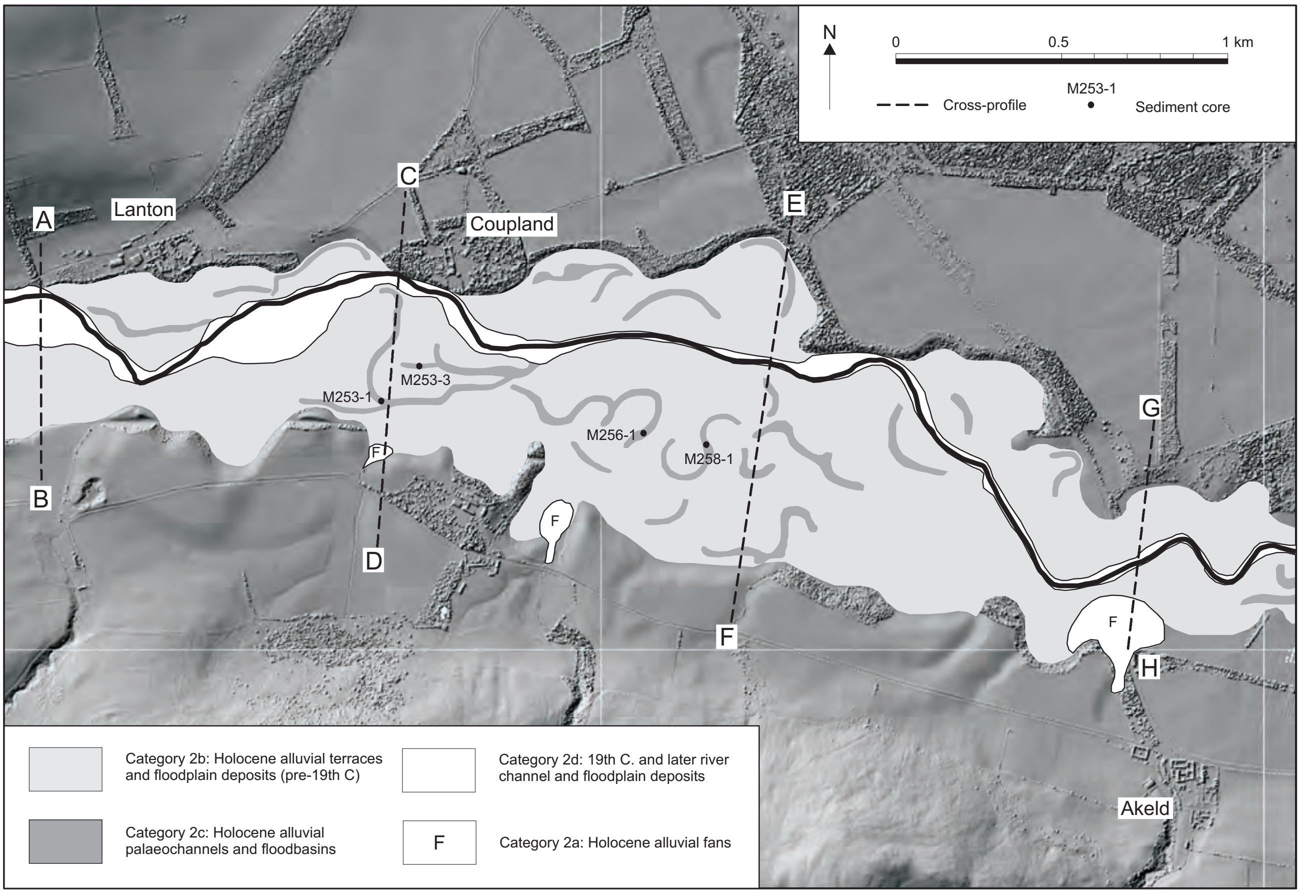


Fig. 2.41. LiDAR-derived digital elevation model of the River Glen valley floor between Lanton and Akeld showing cross-profile locations, major palaeochannels and sediment core locations.

1450–1650. Pollen assemblages from organic-rich infill sediments here show broadly similar characteristics to those described from the adjacent sites and confirm the evidence for a largely deforested landscape with a mix of pastoral and arable land use (Fig. 2.43; Appendix C).

Wooler Water

Late Devensian and Holocene sedimentary sequences in the valley floor of the Wooler Water upstream of Wooler (Fig. 2.1) have been the subject of investigations by Clapperton *et al*. (1971) and Tipping (1992; 1994d), while local channel and floodplain adjustments to recent historic aggregate extraction have also been reported by Sear and Archer (1998). On the western side of the valley an extensive spread of kame, esker and kettle hole deposits lie up to 175m OD and are truncated to the east by a broad gravel terrace some 10m thick and 500m wide that has been termed the Haugh Head Terrace (Tipping 1994d). This surface can be traced downstream through Wooler and out into the Milfield Basin as a broad, low-relief fan that merges with the Holocene alluvial surface and, to the north-west, the low-level glaciofluvial terrace surface developed along the southern margins of the basin (see Category 1d description above; Fig. 2.37). However, and in contrast to the latter glaciofluvial deposits, aerial photographs of the Wooler Water fan exhibit no evidence of periglacial modification (Tim Gates, pers comm). Downstream of Wooler the present channel of the Wooler Water lies inset *c*.1m below the fan surface, but upstream in the vicinity of Earle Mill (1km south of Wooler; Fig. 2.1) some 8m of channel incision has occurred since the 1960's in response to aggregate extraction of channel and floodplain sand and gravel (Sear and Archer, 1998); here, channel bed surveys by local water authorities indicate the 1966 river bed to lie within 1m of the adjacent Haugh Head terrace surface.

Dating controls for the valley fill sequence in the Wooler Water are derived from a 2m thick peat bed buried beneath some 3.5m of fluvial gravels (termed the Earle Mill Terrace by Tipping 1994d). Upper levels of this peat have been dated to *c*. cal 2210–1950 BC (SRR-3658; Tipping 1992; 1994d), but pollen evidence from the lower levels of the sequence suggests the inception of peat development is likely to have begun during the Early Holocene (Clapperton *et al*. 1971). The chronology and character of Late Devensian and Holocene fluvial valley floor development has been

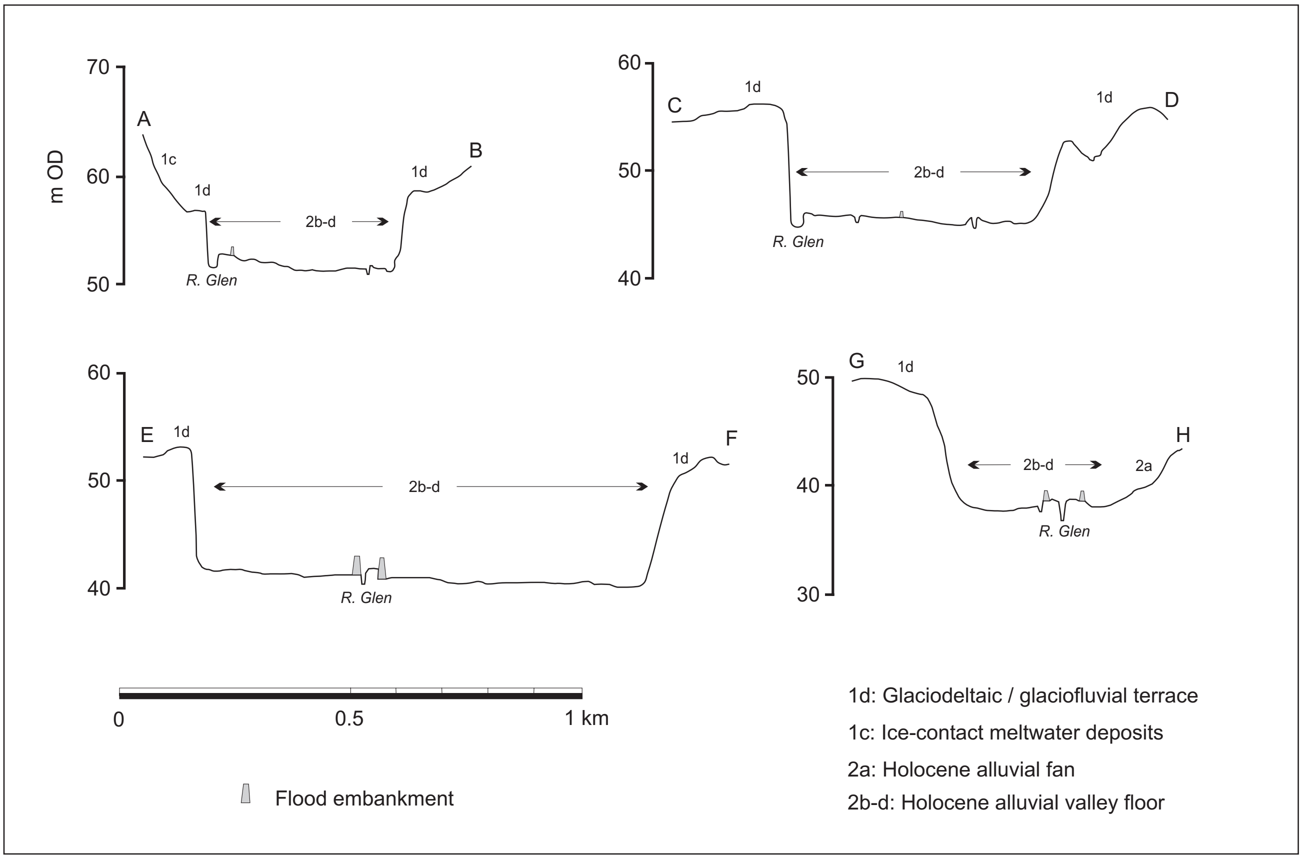


Fig. 2.42. Cross-profiles of the River Glen valley floor between Lanton and Akeld (see Fig. 2.41 for locations).

subject to differing interpretations. Clapperton *et al*. (1971) acknowledge that deposition of the Haugh Head Terrace may have commenced during regional deglaciation (Clapperton *et al*. 1971), but they interpret the Earle Mill peat deposit as a kettle hole fill that was buried by late Holocene gravel aggradation associated with development of the Haugh Head Terrace. Tipping's (1994d; 1998) re-evaluation of the site argued that the peat bed had developed on a poorly-drained alluvial valley floor cut into the Haugh Head Terrace, and that the overlying gravels were associated with a discrete episode of post-2000 cal BC fluvial deposition (termed the Earle Mill Terrace) that aggraded to within 1–2m of the Haugh Head surface. In this model the Haugh Head aggradation is viewed primarily as a response to increased discharge and sediment loads during the Loch Lomond Stadial; the terrace surface was subsequently abandoned by valley floor entrenchment before or during the earliest Holocene. Assessment of these competing interpretations is complicated by the recent history of gravel extraction, and here it is noted that Sear and Archer (1998) regard the Earle Mill terrace and two lower fluvial units as artifacts of post-1960 flooding and gravel mining. However, for the purposes of this project the Haugh Head Terrace has been mapped as a Holocene unit on the basis that the terrace surface, and especially that of the downvalley fan, is likely to have been subject to some degree of Holocene fluvial deposition.

5. The Milfield Basin: Ewart-Etal (River Till)

Below the confluence with the River Glen, the Holocene valley floor of the Till progressively narrows from a width of 1.4km to 0.36km at Milfield, and thereafter occupies a narrow (*c*.0.3km) entrenched valley downstream to a small alluvial basin at Etal (Fig. 2.35). Within this reach, extending between valley km 32–42.5 (Fig. 2.20), the Till has a gradient of 0.0005m/m^{-1} and a meandering channel planform that becomes increasingly constricted downvalley of Milfield (Fig. 2.35). Relief on the alluvial surface is subdued and largely defined by palaeochannel and floodbasin depressions, although ridge and furrow field systems are well preserved on the southern side of the Till between Thirlings and Woodbridge (Figs 2.16 and 2.44).

Several palaeochannel and floodbasin depressions are evident on the Holocene alluvial surface north of the Till opposite the confluence with the Glen (Fig. 2.44). Two palaeochannel segments have been investigated in detail, respectively at core sites Mil 171-5 and Mil 171-4 (Fig. 2.45). Core Mil 171-5 reveals fine-grained Holocene alluvium to infill the palaeochannel to a depth of 320cm, where it overlies coarse sands that

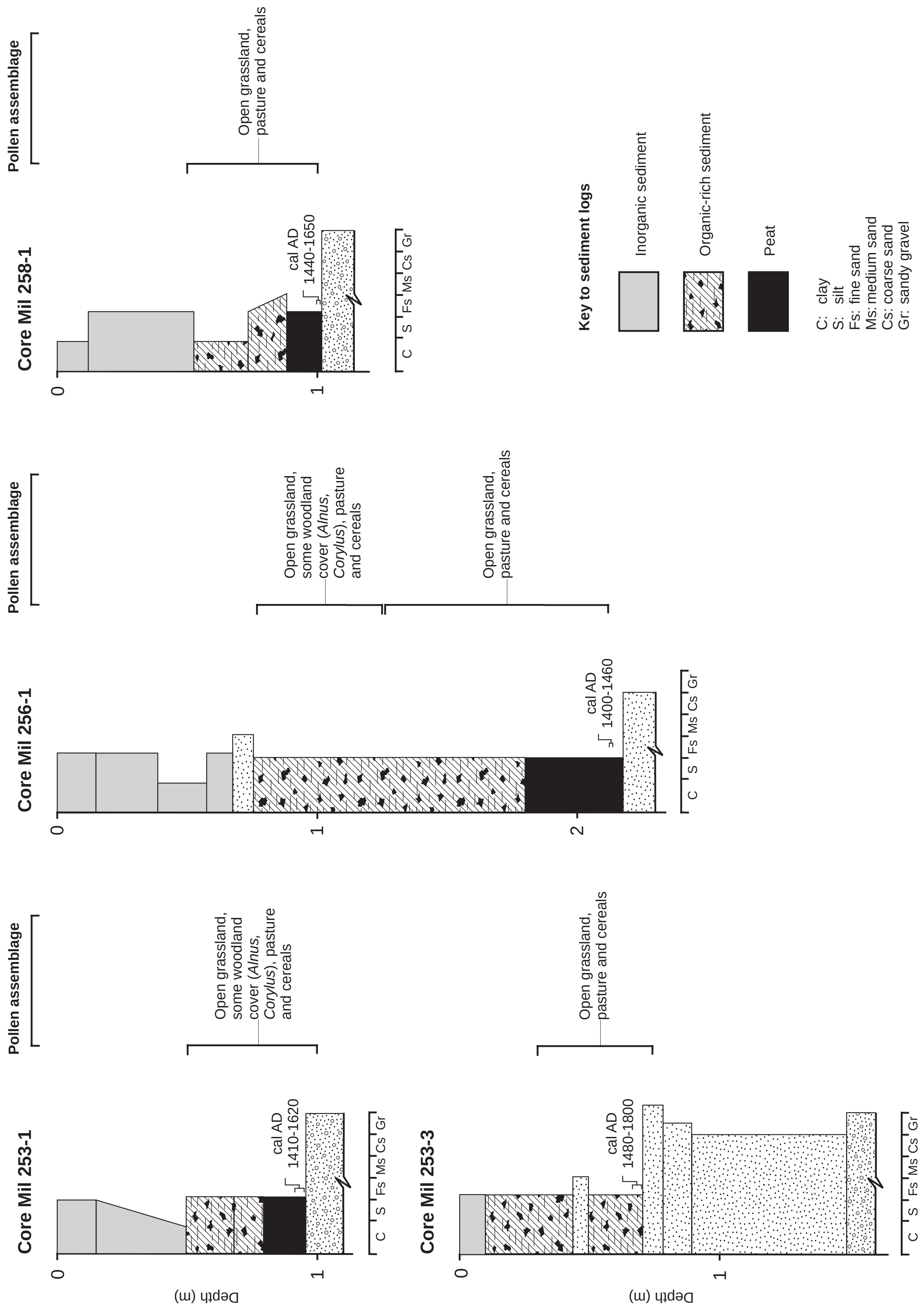


Fig. 2.43. Sediment logs, ^{14}C dates and summary of pollen assemblages for cores M253-1, M253-3, M256-1 and M258-1, River Glen valley.

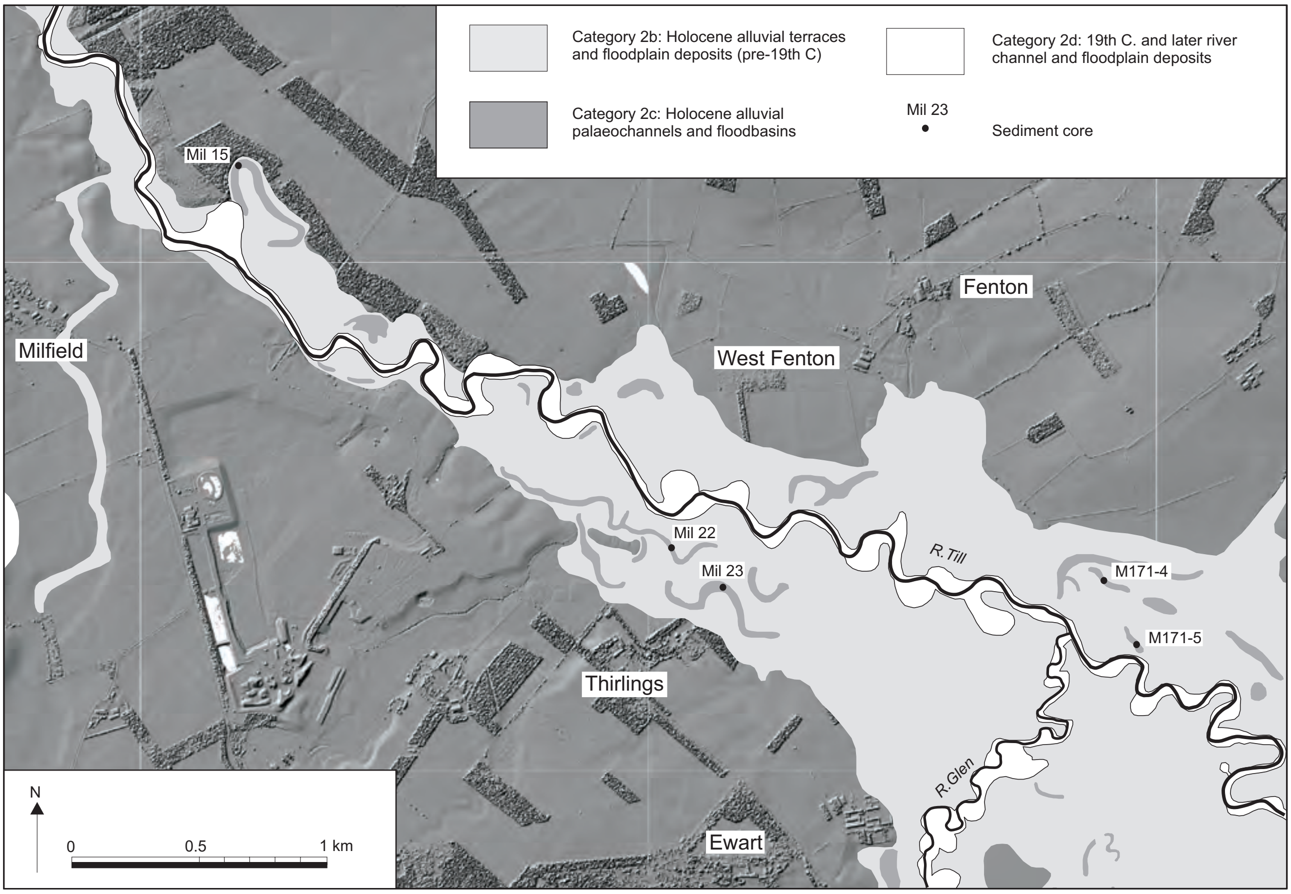


Fig. 2.44. LiDAR-derived digital elevation model of the Milfield Basin between Ewart and Milfield showing major terrace edges, palaeochannels and sediment core locations.

are interpreted as channel abandonment sediments (Fig. 2.45; Appendix C). Channel fill sediments in this sequence feature peaty and organic-rich clayey silt between 115 and 210cm that are dated at 188cm to *c*.1630–1430 cal BC (Fig. 2.45; Appendix C). At core site Mil 171-4 the channel fill deposits are comparatively shallow, reaching a depth of 150cm where they overlie finely laminated, inorganic clays, silts and fine sands. The latter sediments were recorded to a depth of 250cm before coring was terminated and are provisionally interpreted as glaciolacustrine sediments equivalent to those described by Clapperton (1971b) and Payton (1980); they most probably represent the lateral extension of glaciolacustrine deposits that have been mapped as the adjacent landform element (Category 1g) lying some 250m to the north at the margins of the alluvial valley floor (Fig. 2.44). Organic-rich alluvial silts and clays characterise the Holocene infill sequence between 30 and 105cm and have been dated at 88–90cm to *c*.1200–930 cal BC (Fig. 2.45; Appendix C).

Available dating controls suggest therefore that both palaeochannels described here were abandoned and infilling sometime during the Middle to Late Bronze Age. Organic-rich parts of the infill sequences both exhibit pollen assemblages that are largely dominated by local floodplain alder carr and a surrounding landscape of open oak/hazel woodland (Fig. 2.45; Appendix C). Grassland and ruderal pollen are present throughout these sequences although there are no recorded cereal pollen taxa.

On the south-west side of the valley floor in the vicinity of Thirlings, two distinct generations of gently meandering palaeochannels have previously been described by Passmore *et al*. (2002; Fig. 2.44). These channels have dates at the base of their fine-grained and organic-rich infill sequences of *c*.7600–7370 cal BC (core Mil-23: Figs 2.44 and 2.46; Appendix C) and *c*.2130–1740 cal BC (core Mil-22; Figs 2.44 and 2.46; Appendix C), respectively. The older of these channels has a shallow infill up to 140cm in depth with peat and abundant wood and plant remains in the lower 75cm. Pollen counts from the lower part of the assemblage, deposited in the period beginning *c*.7600–7370 cal BC, reflect a valley floor landscape with a birch, willow and juniper scrub (the latter including *B. nana* type) landscape and, especially in the lowest levels of the sequence, abundant sedges and grasses (Fig. 2.46). This assemblage is broadly consistent with vegetation records from other very early Holocene contexts in northern Britain (e.g. Innes and Shen-

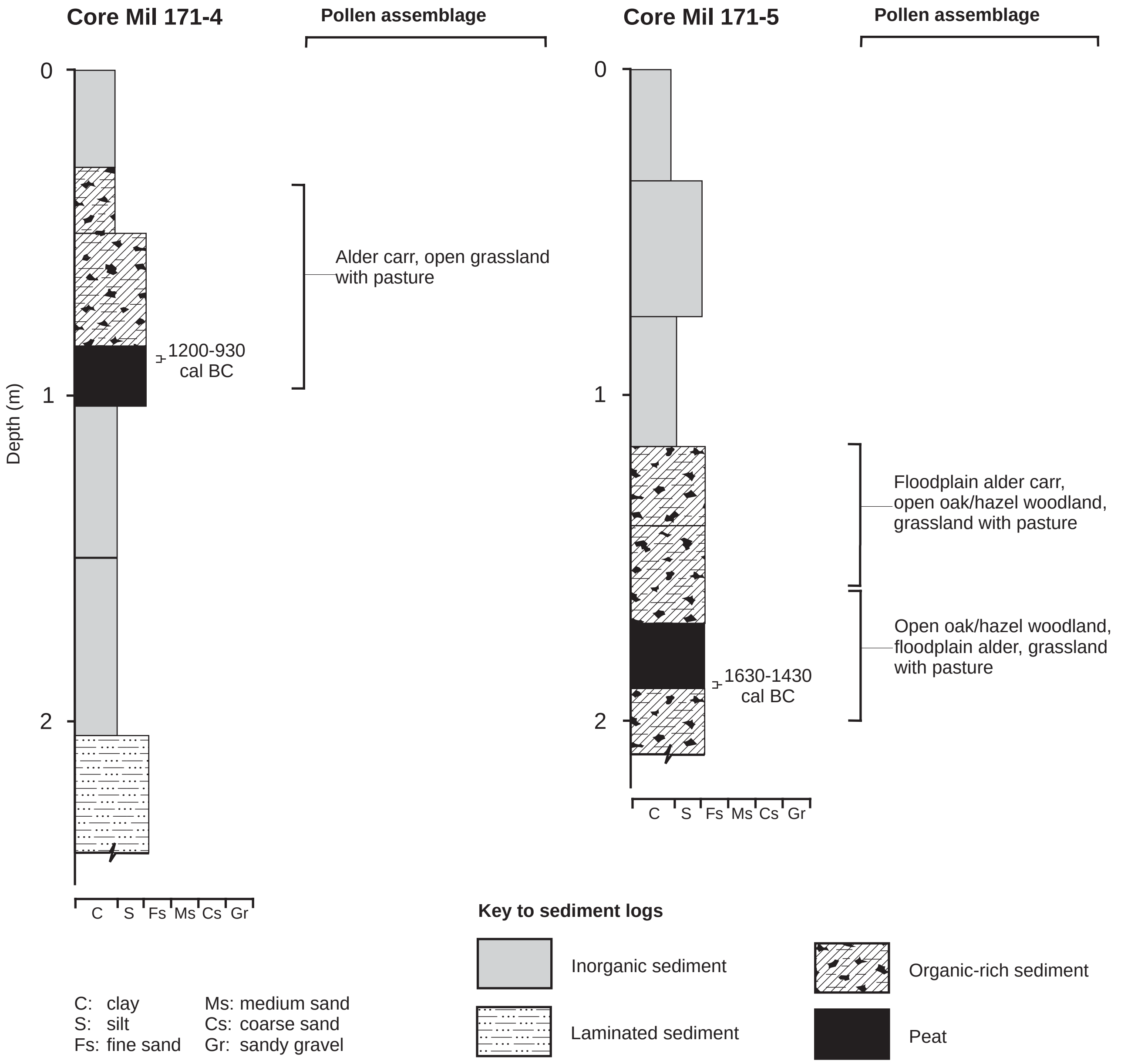


Fig. 2.45. Sediment logs, ^{14}C dates and summary of pollen assemblages for cores Mil 171-4 and Mil 171-5, Milfield Basin (Ewart-Etal sub-reach).

nan 1991), including the sequence at Akeld Steads (Borek 1975; Tipping 1998). A rise in hazel pollen at 110cm coincides with a decline in juniper, sedge and grass pollen and may reflect the end of the pioneer phase for Early Holocene vegetation (*cf*. Innes and Shennan 1991), while the succeeding pollen assemblage at 90cm shows a marked increase in alder and rising values of other broadleaved tree species at the expense of willow and birch. This transition is currently undated, but an equivalent phase at Akeld Steads occurs around *c*.5500 cal BC (Tipping 1998).

Peaty and organic-rich channel fill sediments in the younger palaeochannel at Thirlings have yielded two pollen assemblages spanning 55–235cm (Fig. 2.46). Sediments between 235 and 130cm began accumulating around *c*.2130–1740 cal BC and are characterised by open hazel/oak woodland and floodplain alder carr with areas of grassland, pasture and cereal plots. The upper pollen assemblage, between 130 and 55cm, records a marked reduction in woodland cover across both the drier and wetter parts of the local valley floor and an expansion in pastoral and arable land use. Cereal cultivation in the vicinity of Thirlings would appear, therefore, to have been in progress from at least Early Bronze Age times and was most probably focused on the higher-elevation and free-draining glaciodeltaic terrace to the east of the Holocene floodplain levels (Fig. 2.44).

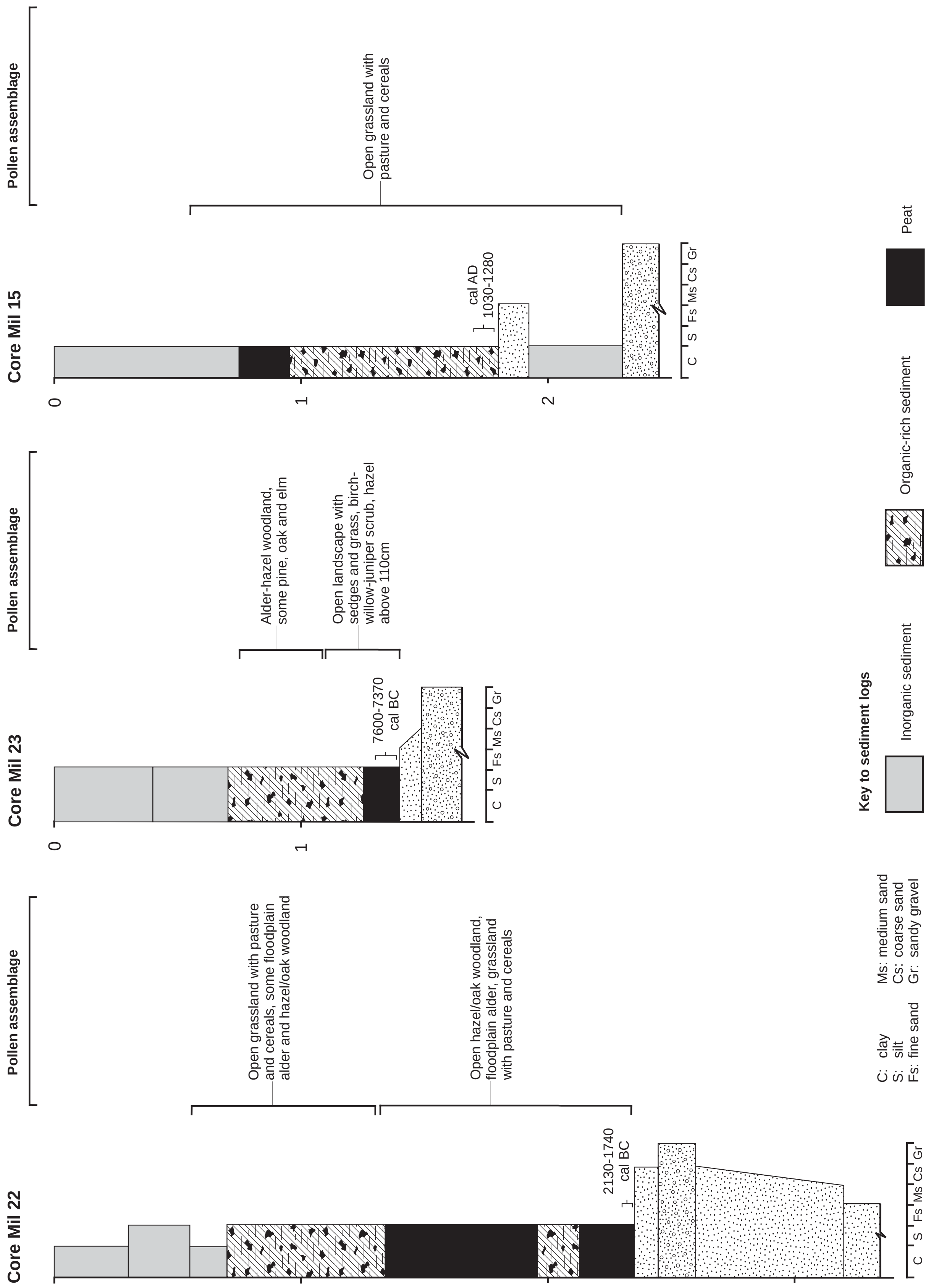


Fig. 2.46. Sediment logs, ^{14}C dates and summary of pollen assemblages for cores Mil 15, Mil 22 and Mil 23, Milfeld Basin (Ewart-Etal sub-reach).

The final dated palaeochannel fill and pollen sequence in the Ewart-Etal sub-reach is located immediately downvalley of Redscar Bridge (Fig. 2.44). Here the valley floor is only 0.36km wide and features a highly sinuous palaeochannel that lies tucked against the steep bluff of a glaciodeltaic (Category 1d) terrace on the north-east side of the Holocene alluvial surface. Sediment core Mil-15 has revealed peaty and organic-rich channel fill deposits at this location to extend between 55 and 230cm in depth, where they overlie sandy gravels of the former channel bed (Passmore *et al*. 2002; Fig. 2.46). A date of cal AD 1030–1280 (Passmore *et al*. 2002; Appendix C) from a depth of 170–178cm indicates that this channel was abandoned at around the beginning of the medieval period. Pollen counts throughout the fine-grained infill sediment below 55cm reveal the contemporary landscape to be substantially cleared of woodland, with extensive areas of pasture, hay meadows and cereal plots (Fig. 2.46; Appendix C).

6. Etal-Tweedmill (River Till)

The River Till follows a north-westerly course between Etal and its confluence with the lower Tweed at Tweedmill (valley km 42.5–52.5; Figs 2.20, 2.47 and 2.48). Here the lower reaches of the Till are narrowly confined in a meandering bedrock gorge cut through Fell Sandstone and Cementstone and the overall gradient of the present channel is relatively steep at $0.002m/m^{-1}$ (Fig. 2.20). Flanking the channel are narrow floodplain deposits of 19th century and later date, while discontinuous low terraces some 2–3m above the current channel and with a maximum width of 100m are developed in relatively wider parts of the gorge and are assumed to be of Holocene age. To date there have been no investigations of Holocene sedimentary sequences in this part of the Till valley.

7. The lower Tweed below Coldstream

The lower Tweed study block encompasses a 21km reach of the Tweed between Coldstream and the

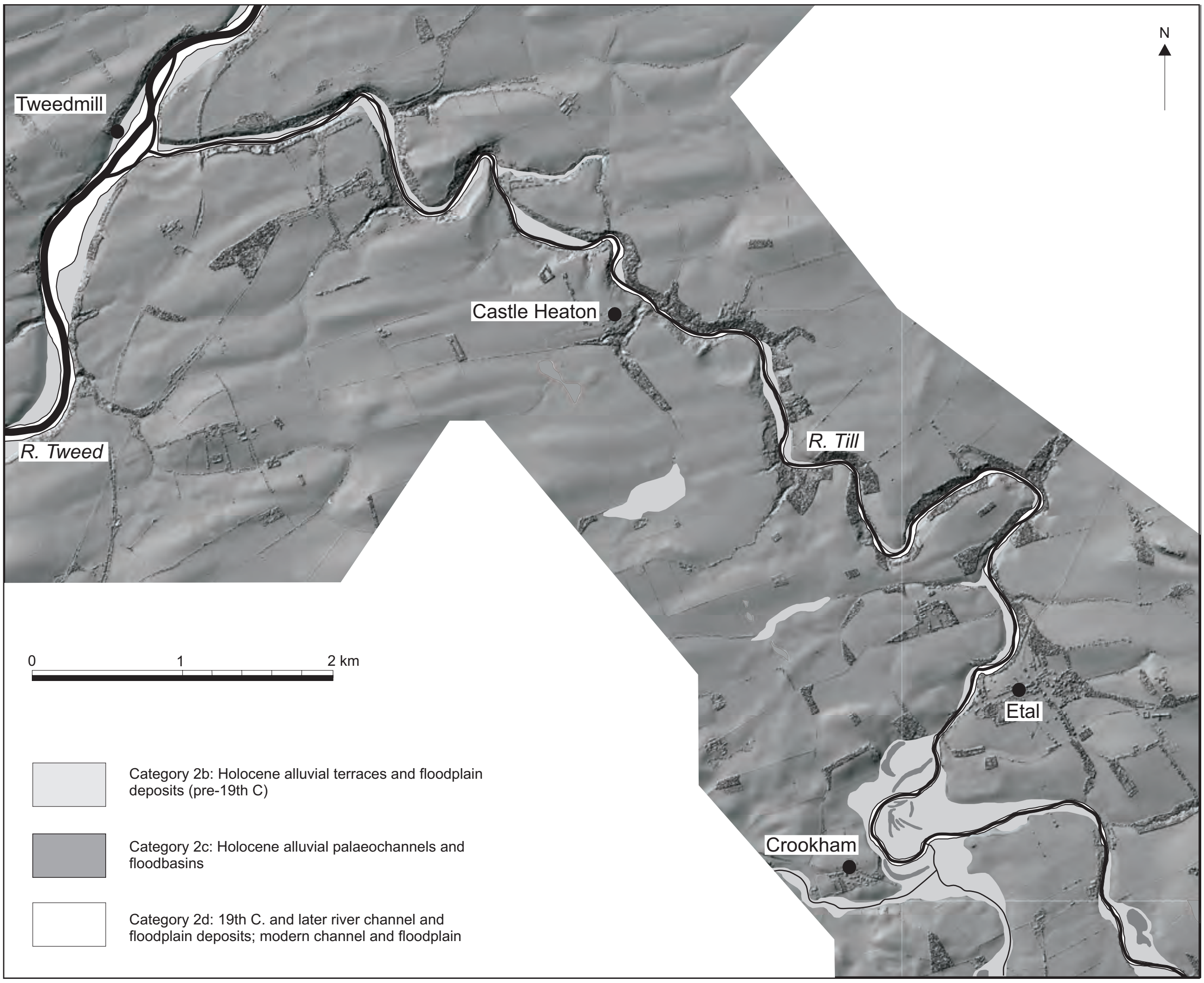


Fig. 2.47. LiDAR-derived digital elevation model of sub-reach Etal-Tweedmill (Till valley) showing Late Devensian and Holocene landform elements.

Fig. 2.48. The River Till above the confluence with the Lower Tweed at Tweedmill, looking upstream.

A1 road crossing 5km upstream of the river mouth at Berwick (Fig. 2.49). Within this reach, the River Tweed has a gently meandering gravel bed channel with a sandy floodplain and several vegetated mid-channel islands (Fig. 2.50). The present floodplain of the River Tweed is up to 200m wide between confining nineteenth century embankments and lies up to 1.5m below the adjacent Holocene alluvial valley floor. Since the mid-nineteenth century there have been several meander cut-offs and lateral channel shifts which have reworked alluvial deposits in this relatively narrow zone of fluvial activity. In combination, fluvial surfaces dating from the mid-nineteenth century (Category 2d, Fig. 2.49), including the present channel and floodplain, account for 4.5km^2 (*c*.3%) of the Tweed study block.

Holocene alluvial deposits pre-dating the 19th century (Category 2b) flank the lower Tweed throughout the study reach and are most extensive in the wider alluvial basins at Coldstream, Ladykirk House, Norham, Horncliffe and Gainslaw House (Fig. 2.49). The Holocene valley floor has well-defined margins, being inset up to 3m below the youngest glaciofluvial (Category 1d) terrace, and between 7–20m below undifferentiated drift deposits (Category 1b) and underlying bedrock. Trunk valley floor relief ranges between 2 and 18m OD, with distinctive terrace scarps that delimit alluvial surfaces of differing age and well-defined palaeochannel depressions that attest to changes in river channel location during the Holocene period (Fig. 2.49). Holocene river terraces encompass an area of over 9km^2 within the study block, of which 0.8km^2 are palaeochannel depressions (Table 2.1). Detailed investigation of these landform-sediment assemblages in the lower Tweed have focused on two alluvial basin locations, respectively at Coldstream and Green Hill, near Horncliffe (Fig. 2.49).

Coldstream

The study reach at Coldstream extends over 3km of the valley floor between Wark and Coldstream Bridge (A697) and encompasses a large meander bend of the modern River Tweed (Fig. 2.51). Here the Holocene valley floor is 1.5km wide and is dominated by an extensive, low-relief terrace (T3) that lies inset below glaciofluvial terraces (Category 1d) and ice-contact meltwater deposits (Category 1c). At the western end of the study reach at Wark, two low-relief terraces lie respectively 5m (T1) and 3m (T2) above T3; these terraces lack dating control but are provisionally assumed to represent the final stages of glaciofluvial reworking and outwash deposition during deglaciation.

Terrace T3 features several palaeochannel depressions that are inset up to 1m below the terrace surface. Channel planform morphology on the southern side of the valley broadly parallels the present river with a series of channel remnants that appear to represent the episodic downvalley migration of a large single-thread meander bend. T3 deposits on the northern side of the valley occupy a narrow terrace fragment opposite Wark, but for the most part are enclosed inside the large-scale meander loop (Lees Haugh) of the present River Tweed. Several palaeochannel remnants on this surface parallel the downvalley limb of the meander, while at least one large channel fragment is oriented in a north-easterly direction and may represent a neck cut-off of an earlier generation of meander loop (Fig. 2.51). A further channel oriented north-south in the western part of this surface most probably represents an earlier course of the Leet Water, a tributary of the Tweed that presently joins the trunk river 0.5km upstream of Coldstream Bridge (Fig. 2.51).

Fluvial sedimentary sequences at Coldstream have been investigated by a programme of sediment coring, augmented by sedimentary data obtained by a previous (unpublished) investigation at the site (Passmore and Macklin, unpublished data) (Appendix D). Figure 2.52 shows selected sediment core logs and a schematic model of the valley fill at Coldstream. Sediments below the main T3 surface were found to typically comprise an upper fine member of fining-upward gravelly coarse sands, well-sorted medium–fine sands and massive fine sandy silt between 40 and

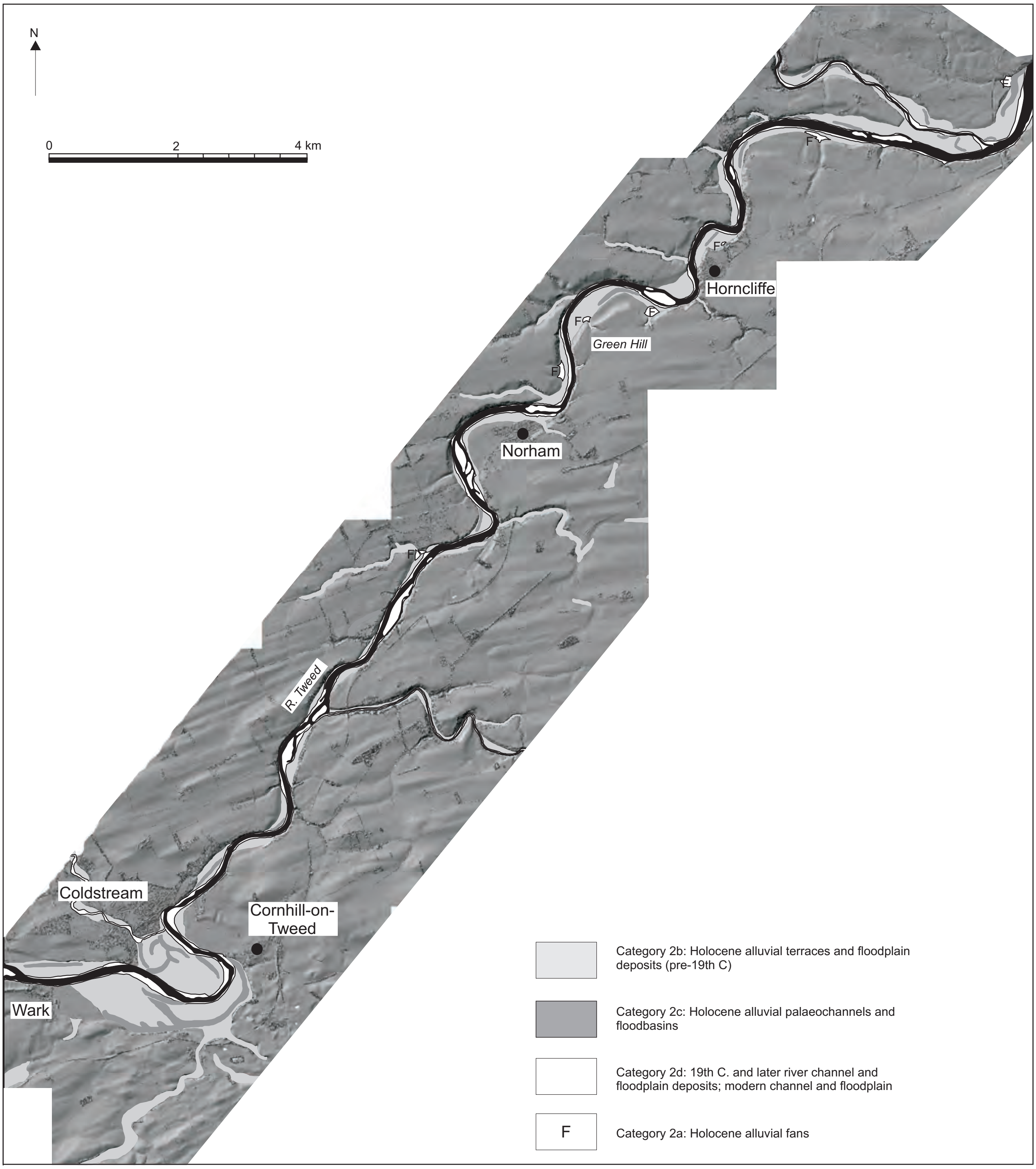


Fig. 2.49. LiDAR-derived digital elevation model of the Lower Tweed valley showing Holocene landform elements and study reaches.

220cm thick. Organic content in these sediments was confined to occasional charcoal fragments. The fine member overlies an impenetrable coarse gravel member of indeterminate thickness (Fig. 2.52). Basal gravels are interpreted as former channel bed and bar deposits that are buried by a variable thickness of bar-top sands and fine gravels and overbank (floodplain) sandy silts.

Palaeochannel fills in the T3 terrace were found to generally comprise fining-upward sequences up to 3.4m thick, overlying impenetrable channel bed gravels. Fill sequences were typically composed of bedded coarse–fine sands and massive fine sandy silts with occasional beds of organic-rich silt, peaty silt and peat (Appendix D). Organic-rich deposits are most thickly developed at palaeochannel locations at

Fig. 2.50. The River Tweed at Norham, looking upstream from the B6470 road bridge.

or near the valley side where their long-term preservation may be promoted by high groundwater levels fed by valley-side springs and seepages. At core TW10, located in a palaeochannel undercutting the southern valley side margin (Fig. 2.52), plant macrofossils recovered from basal channel fill sediments at a depth of 270–280 cm gave a ^{14}C date of *c*. cal 50 BC–AD 80 and provide a maximum age for channel abandonment at this location. Truncating this palaeochannel is a well-preserved, sinuous palaeomeander that extends for some 2.4km along the southern valley margin near West Learmouth (Fig. 2.52). Two sediment cores spaced 400m apart in this palaeochannel, respectively at sites CDS1 and TW11 (Fig. 2.52), found channel fills to reach a maximum depth of 320cm. Organic-rich and peaty sediments featured in both fills, respectively at depths of 95–210cm (CDS1) and 240–280cm (TW11), and have been dated by paired ^{14}C samples in their lower levels that yielded a closely overlapping date range of *c*. cal AD 990–1170 (Appendix D). On the northern side of the valley floor, a T3 palaeochannel that dissects the northern part of Lees Haugh has been dated by earlier investigations at CDS11 by Passmore and Macklin (unpublished; Fig. 2.52). Channel fill sediments at this location were found to reach a depth of 220cm and featured grey peaty silty clay between 160 and 200cm (Fig. 2.52). Lower levels of this unit have been dated to *c*. cal AD 1280–1410 and would suggest that this channel was abandoned during the later medieval period.

The sequence of palaeochannels and (minor) terrace escarpments in the valley floor of the Coldstream sub-reach suggest that the floodplain has been formed by the migration and/or episodic avulsion of a large meander bend during the Holocene period. Recent historic activity of the river has been confined by flood embankments and has witnessed floodplain alluviation associated with agricultural expansion and drainage intensification in the nineteenth century (e.g. Owens and Walling 2002; Owens *et al*. 1999).

Analysis of the palaeoecological record of organic-rich channel fill sediments in TW10, TW11 and CDS1 has provided a record of the environment local to, and surrounding, the core sites contemporary with deposition (Figs 2.53 and 2.54). Pollen assemblages show the Late Iron Age and medieval landscape of the valley floor and adjacent terraces and uplands to be largely deforested or supporting open woodland (mainly alder, oak and hazel) with evidence of grassland and pastoral agriculture. Aquatic environments in the low-lying palaeochannel habitats are evidenced in the lower part of the sequences by high pollen counts of aquatic emergents (Cyperaceae, *Typha angustifolia*/*Sparganium*), and this is supported

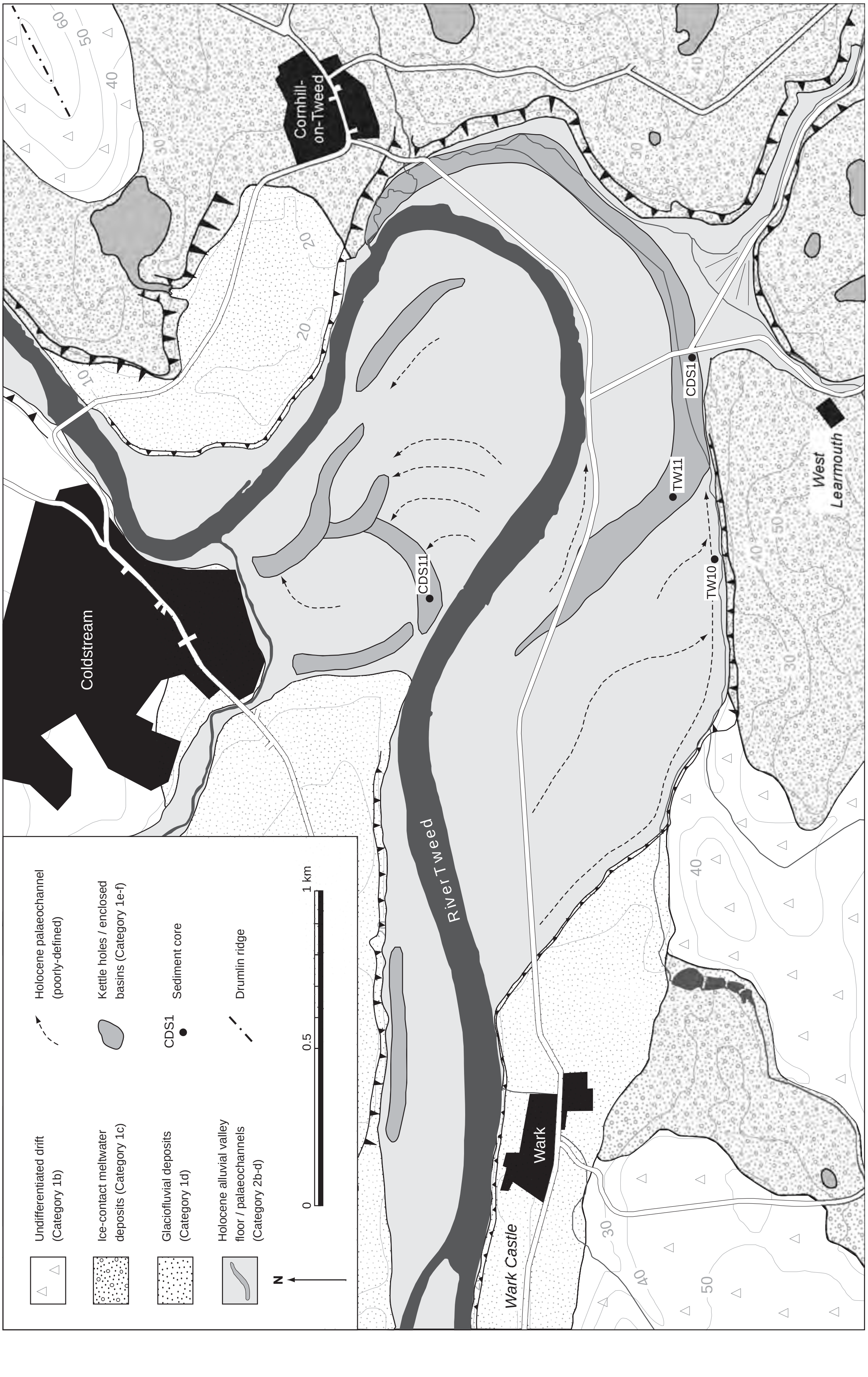


Fig. 2.51. Geomorphological map of the Lower Tweed valley at Coldstream showing major terrace edges, palaeochannels and sediment core locations.

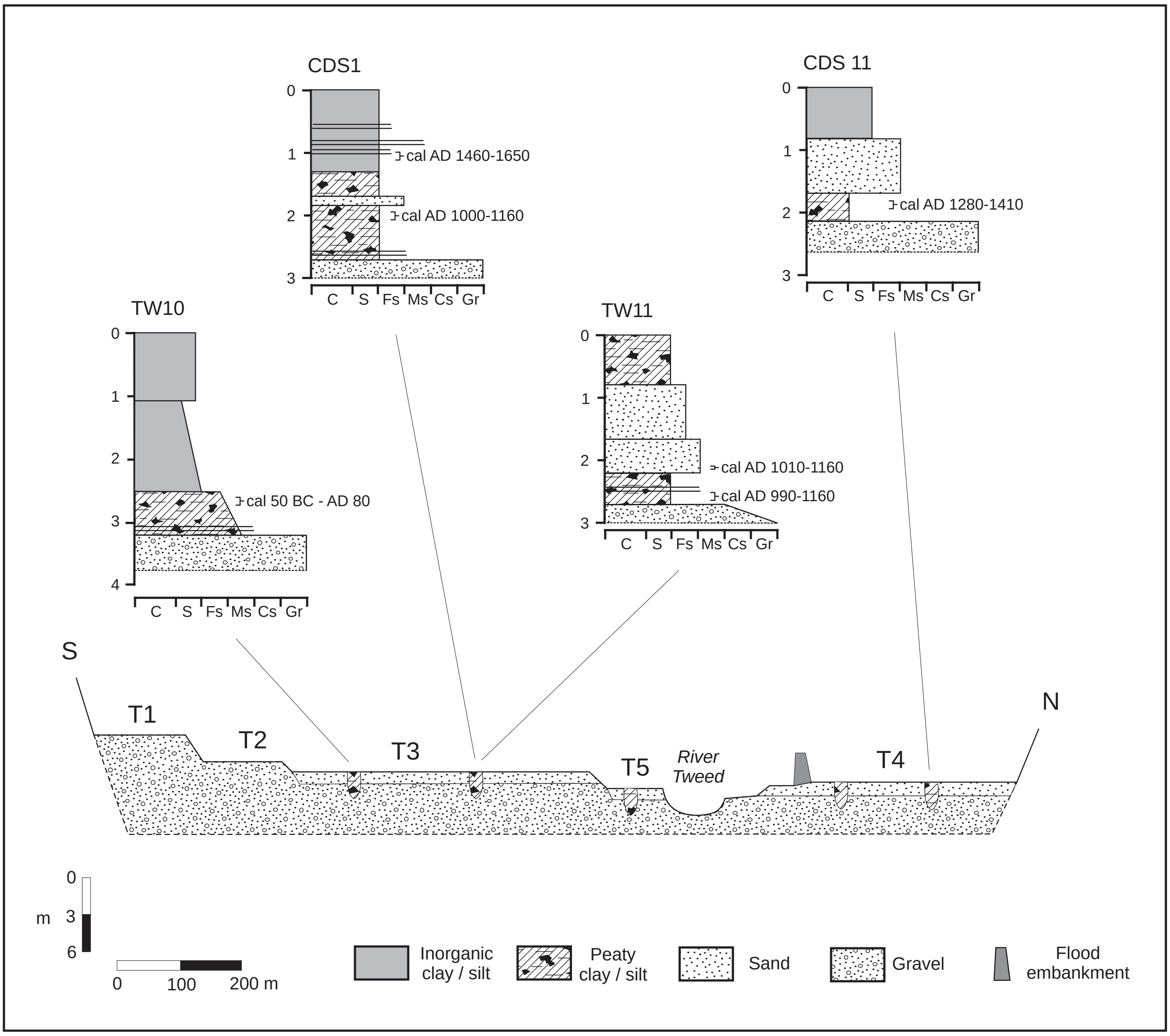


Fig. 2.52. Selected sediment logs and schematic valley fill model for the Lower Tweed at Coldstream.

by macrofossil remains of aquatic and wetland species (e.g. *Alisma plantago-aquatica* and *Potamogeton spp*.) indicative of open water and vegetated margins. The pollen record at Coldstream does not yield direct evidence of local arable agriculture, but macrofossil assemblages from core CDS1 (Fig. 2.53) included a charred breadwheat cereal grain (*Triticum aestivum*) between 190 and 196cm and charred cereal grains and a cereal stem between 160 and 150cm. This material is most probably derived from cereal processing in the vicinity of the site shortly after *c*. cal AD 1000–1170.

Horncliffe/Green Hill

The study reach at Green Hill extends over 2km of the Tweed valley floor upstream of Horncliffe (Fig. 2.49). The present River Tweed in this reach has a gently sinuous planform with its outer meander bends cut into steep river bluffs of undifferentiated drift deposits and underlying bedrock (Fig. 2.55). Holocene fluvial deposits are developed on the inner bends of each meander where they lie 5m below glaciofluvial terraces. An extensive low-relief terrace dominates the Holocene valley floor and has a surface elevation 4m above the present channel; on this basis it is provisionally correlated with the T3 terrace unit at Coldstream, 12km upvalley from Green Hill. A shallow and poorly defined palaeochannel survives on the southern terrace unit where it lies parallel with the adjacent glaciofluvial terrace scarp, while small alluvial fans (Category 2a) grade to this terrace surface at the mouth of gully systems cut through undifferentiated drift. Younger terrace fragments survive as narrow and discontinuous inset surfaces lying 1m below the main terrace; these correspond to the surface of a prominent, vegetated mid-channel bar known locally as Long Island (Fig. 2.56). The 19th

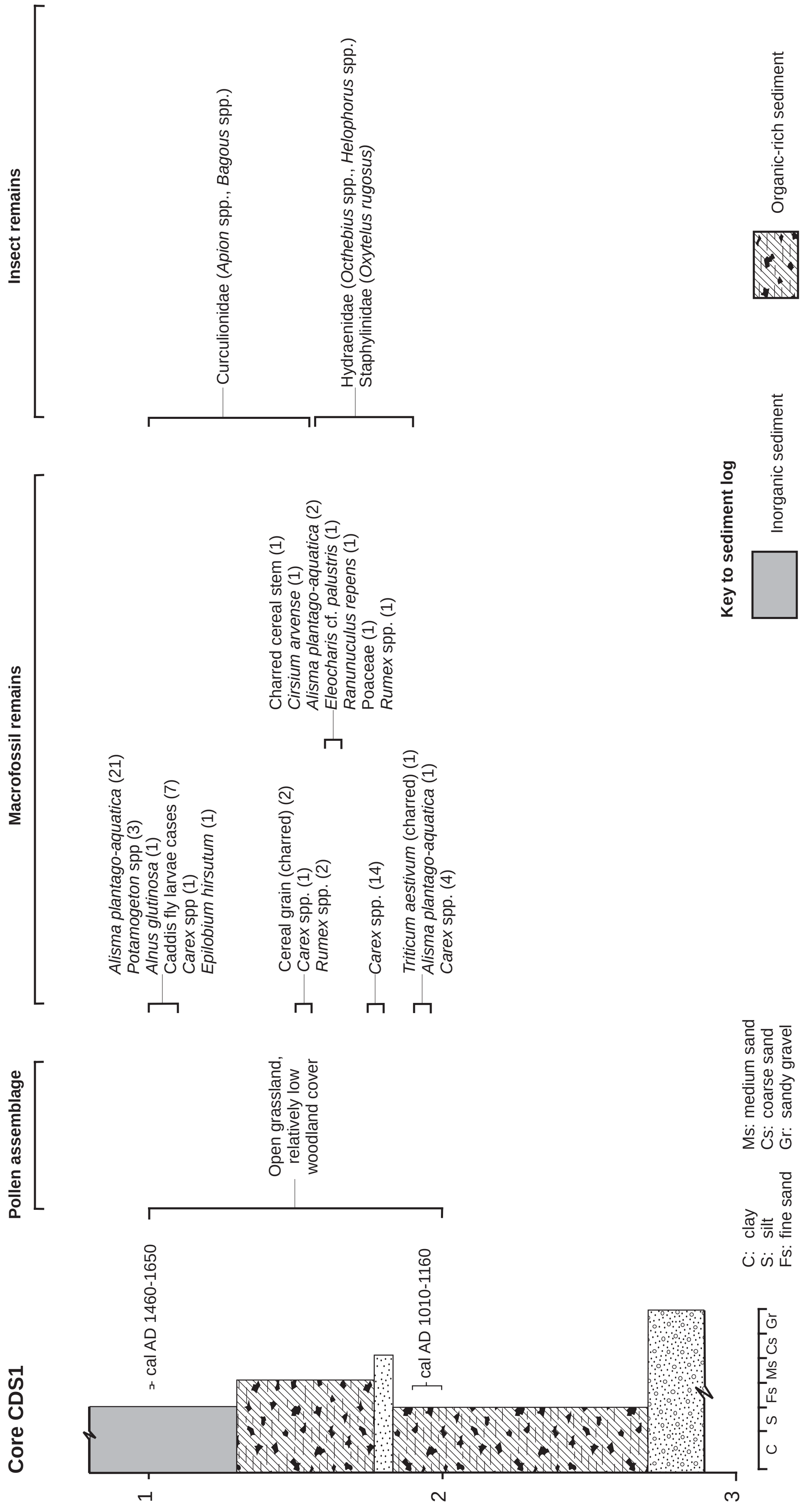


Fig. 2.53. Sediment log, ¹⁴C dates and summary of pollen, plant macrofossil and insect assemblages for core CDS1, Coldstream, Lower Tweed valley.

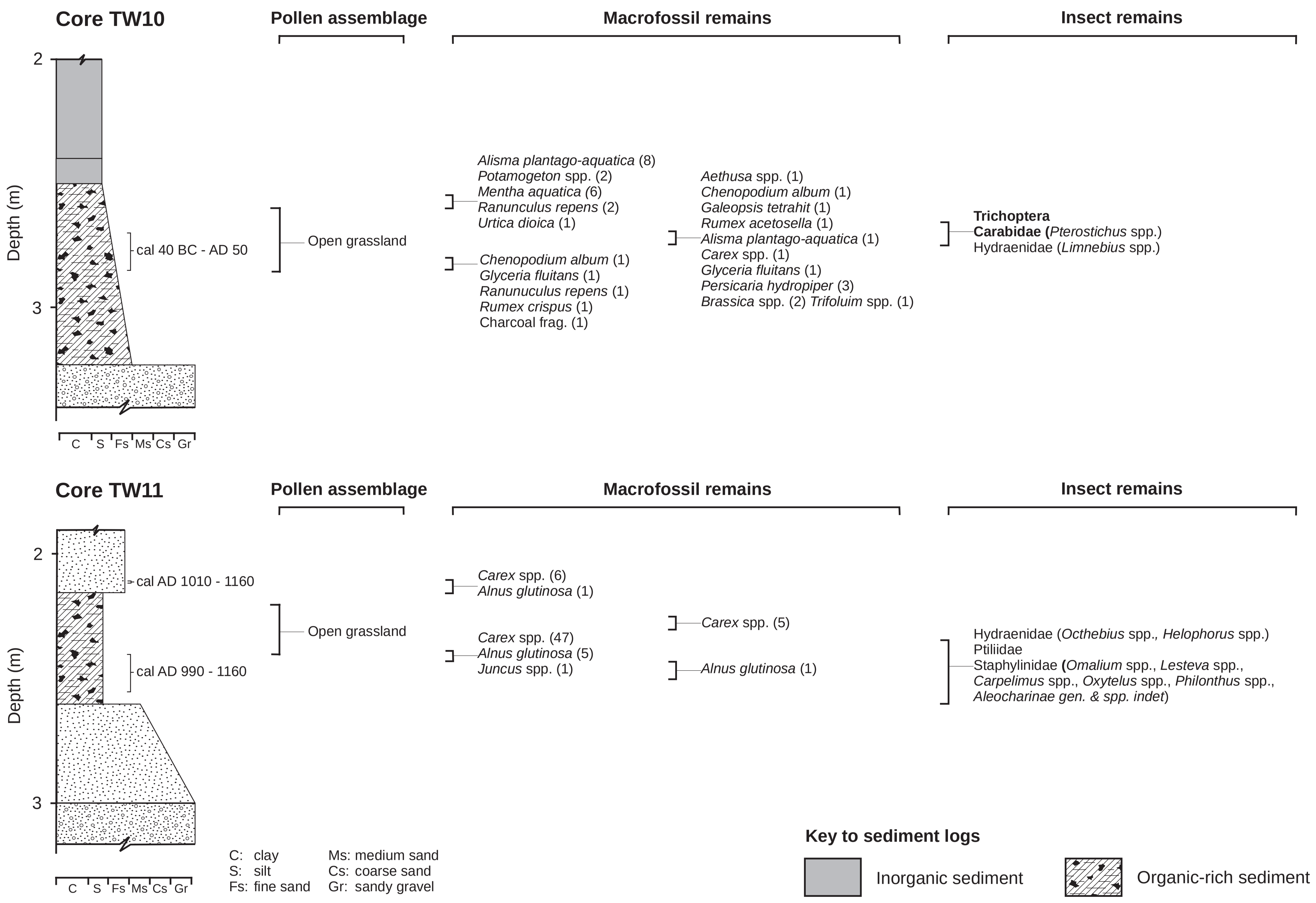


Fig. 2.54. Sediment logs, ^{14}C dates and summary of pollen, plant macrofossil and insect assemblages for cores TW10 and TW11, Coldstream, Lower Tweed valley.

Fig. 2.55. The River Tweed at Horncliffe, looking downstream.

Fig. 2.56. The River Tweed and Long Island at Horncliffe, looking upstream towards Green Hill.

century and later floodplain (Category 2d) is present as narrow inset benches flanking the present channel (Figs 2.49, 2.55 and 2.56).

Valley floor sedimentary sequences in the Green Hill reach were investigated in three cores taken from the western end of the reach (Appendix D). Sedimentary sequences underlying the main terrace surface were found to comprise a fine member of poorly bedded, unstructured and inorganic grey silty clay with occasional fine sandy laminations. These sediments reached a minimum depth of 350cm above impenetrable gravels and locally exceeded 400cm before coring was terminated. By comparison with Holocene fills at Coldstream, the main Holocene terrace at Green Hill has a more thickly developed and finer-grained upper member with a distinctive grey colouration. No material suitable for radiocarbon dating was recovered from these sediments, and at present it is unclear whether this sequence represents the fill of a wide and deep palaeochannel belt (without surface expression) or, given the location of the reach within the tidal limit of the river, reflects tidally influenced sedimentation in a perimarine depositional environment.

Summary of the lower Tweed fluvial history

Holocene fluvial terraces of the lower Tweed are inset 3–4m below the lowest glaciofluvial terrace surfaces and were developed following a period of valley floor incision through outwash deposits that probably occurred shortly after deglaciation of the region. At Coldstream, the pattern of Holocene valley floor development appears to have been dominated by the episodic downvalley migration and avulsion of a large meander bend. At least two major phases of channel abandonment are recorded shortly before *c*. cal 50 BC–AD 80 and cal AD 990–1170; the later of these events may have been associated with neck cut-off of the meander that is represented by the palaeochannel cored at CDS11 (Fig. 2.51). Development of the present meander loop occurred during the period between shortly before cal AD 1280–1410 and the nineteenth century. This pattern of activity has resulted in lateral age zonation of Holocene fluvial sediment infilling the valley floor, with some limited fine-grained alluviation (up to *c*.100cm) capping terrace surfaces. Palaeochannel depressions, however, have accumulated thicker sequences of infill sediment that are organic-rich near the valley margins. Construction of large flood embankments in the early nineteenth century may have promoted localised incision and reworking in the confined active channel and floodplain zone after this time, and especially during and after nineteenth century agricultural expansion and drainage intensification. Fine-grained sedimentation on lower-elevation alluvial surfaces at Coldstream has continued despite channel incision and embanking over the past *c*.100 years (Owens and Walling 2002; Owens *et al*. 1999). The broad pattern of confined meandering and channel cut-off at Coldstream is also evidenced by Holocene terrace and palaeochannel morphology in the downstream alluvial basins of the lower Tweed study reach, particularly at Norham and Horncliffe/Green Hill (Fig. 2.49). At present, however, there are no dating controls for these valley fills. In the narrower intervening reaches there is only limited space for floodplain development and rates of reworking are likely to have been relatively high.

Holocene alluvial fans and colluvial spreads

Holocene alluvial fans form a distinctive but relatively small component of the Holocene landscape in the Till-Tweed study area, accounting for less than 1km^2 of the mapped study blocks (Category 2a landform elements; Table 2.1; Fig. 2.19). Fans have typically formed along the margins of the Holocene valley floor, where small tributary streams emerge from gullies and minor valley networks incised into glacial, glaciofluvial and glaciolacustrine deposits (Fig. 2.19). Although the age of these fans is currently subject to confirmation, many of these features prograde over Holocene alluvial surfaces and have locally buried former landsurfaces, including older parts of the fans themselves. Included in this landform element category are Holocene colluvial deposits that mantle the lower facets of hillslopes and terrace bluffs throughout the study area, as well as forming lynchets upslope of field boundaries. To date, however, mapping of colluvium has lain been beyond the scope of this project and its presence is noted here for the purpose of informing archaeological evaluation strategies. A preliminary assessment of colluvial sediment thickness has been undertaken by machine trenching of hillslope and lynchet contexts at Milfield Hill and below Dove Crag (both located on undifferentiated drift – Category 1b landform elements), and on a glaciodeltaic terrace bluff near Akeld Steads; the results are summarised in Appendix E.

Holocene peat bogs and mires

Shallow valleys and depressions formed in landscapes of Lateglacial origin, and poorly drained hilltops on higher parts of the Fell Sandstones have been locally subjected to accumulation of peat bog and mire deposits (Category 2e landform elements; Fig. 2.19). Deposits of this type are generally well recognised on regional geological maps and Ordnance Survey map coverage, and for the purposes of this project, Category 2e areas have been delimited using these map sources, augmented where possible by analysis of aerial photographs. This analysis indicates that bog and mire deposits account for nearly 4km^2 (less than 1%; Table 2.1) of the mapped study blocks. Many of these areas have been affected by forest plantations and/or modern drainage works, and hence are liable to have been modified by surface cutting and lowering of water tables. Investigations of the depth and character of peat bog and mire sequences have not been undertaken for this project, save for an ongoing palaeoecological analysis of a core at Ford Moss (NT96923764) that will be reported in the forthcoming companion volume (Passmore and Waddington in prep.).

OVERVIEW: LANDSCAPE CHANGES OVER THE PAST 20,000 YEARS

Landscapes of the lower Tweed and Till valleys have been extensively modified by the combination of Late Devensian ice and meltwater. Over 360km^2 (65%) of the mapped landscape is glacially smoothed bedrock or is covered with a variable thickness of sub-glacial till that in places, and especially throughout much of the lower Tweed area, has been moulded to reflect the predominant direction of ice flow. Subsequent deglaciation of the region is reflected in extensive sand and gravel deposits associated with ice-contact meltwater and glaciofluvial outwash. Together with localised glaciolacustrine sedimentation, these processes have shaped nearly 143km^2 (26%) of the study block landsurfaces. It was not until the climate warming of the Holocene that these extensive glacial and proglacial landscapes were stabilised beneath a soil and vegetation cover; for much of the following 10,000 years they have experienced relatively little geomorphic activity save for localised colluviation on hillslopes, partial infilling of depressions formed in glacial and glaciofluvial landsurfaces and the blanketing of some hilltop localities by bog and mire formation.

Holocene river environments, by contrast, have been subject to frequent and widespread changes in river channel courses that have been associated with localised reworking of floodplain and fluvial terrace sediment. Channel and floodplain development over this period does not appear to have been associated with significant fluvial downcutting of the valley floor, although some limited incision is evident since the 19th century. This pattern of Holocene fluvial activity has resulted in a low-relief fluvial valley floor that locally exhibits marked lateral age zonation (*cf*. Lewin 1993) but also, and especially in the Milfield Basin, has been subject to vertical aggradation and burial of floodplain surfaces with a variable depth of fine-grained alluvium. The results of this research indicate that wider parts of the alluvial valley floors of the lower Tweed and Till contain sedimentary sequences that extend back to the earliest Holocene, and locally bury Lateglacial landsurfaces. Narrower stretches of the river valley, by contrast, often preserve only a relatively young alluvial sequence that frequently post-dates the later Iron Age and in some cases the medieval period.

A general bias towards sediment units of later Holocene age has been noted in reviews of the UK Holocene fluvial record and is believed to reflect, at least in part, the more favourable preservation potential of younger deposits (Lewin and Macklin 2003). There is also increasing evidence that fluvial system behaviour in the UK has been strongly conditioned by centennial-scale climate changes and the occurrence of extreme flood events (Macklin *et al*. 2005). However, it is also likely that the river systems of the Till and Tweed, as is the case with many other northern British drainage basins, were strongly sensitised to changes in flood frequency and magnitude by large-scale catchment deforestation and agricultural activity from the later prehistoric period (e.g. Passmore and Macklin 2000; Macklin *et al*. 2005; Foulds and Macklin 2006; Chiverrell *et al*. 2007).

Palaeochannel and floodbasin fills in the Till-Tweed study area have been shown to contain relatively short but potentially high-resolution and strongly localised palaeoenvironmental records that are complementary to the longer regional-scale pollen records from peat deposits in upland Northumberland and the Borders. Sedimentary sequences analysed here contain a record of localised woodland clearance, pastoral land use and also the cultivation of cereals, including some evidence of very early experimentation with arable crops that greatly complements the Neolithic and later archaeological record. Refining the chronology and resolution of these records remains, however, a challenge for future research.

3 The Stone Age Landscape: Fieldwalking and Test Pits

Clive Waddington

INTRODUCTION

The archaeology of the Stone Age landscape is perhaps best perceived through the distribution of chipped stone artefacts, which are virtually indestructible and have a wide pattern of discard. For the Neolithic at least, structural remains associated with settlements are now emerging for this period as a result of house construction at Whitton Park (Waddington 2006) and large-scale topsoil stripping has revealed pit clusters and buildings at Thirlings (Miket 1987), Cheviot Quarry (Johnson and Waddington in press) and Lanton Quarry (Waddington and Johnson in press), notwithstanding the various ploughed-out ceremonial monuments of the Milfield Basin known from aerial photography (e.g. Harding 1981; Miket 1981; this volume Chapter 4). However, the settlement evidence is difficult to prospect for using conventional techniques such as aerial photography, geophysics or evaluation trenching. As chipped stone artefacts are widespread and can be found in the soil on most field surfaces, systematic collection and analysis of these artefacts over wide tracts of landscape can yield information relating to general patterns of land use, and occasionally the identification of specific sites. Given that fieldwalking programmes can be pitched on a landscape-wide scale, they provide an ideal method for investigating past human lifeways that included high levels of mobility. As most of the Stone Age extends over periods when people are thought to have maintained relatively high levels of mobility, such research programmes are ideally suited to the investigation of Mesolithic, and to some extent Neolithic/Early Bronze Age, land use. Although the question of settlement mobility and sedentism during the Neolithic remains contentious (see contrasting arguments in Barclay 1996; Darvill 1996 and Thomas 1996 for example) the fieldwalking evidence can assist with this debate: we should expect widespread distribution of artefacts for both the Mesolithic and Neolithic periods if high levels of mobility for both periods are assumed.

While this survey builds on a previous fieldwalking programme undertaken by the author and published in 1999 (Waddington 1999), the results reported here form a separate and new dataset. This survey includes substantial tracts of sand and gravel terraces, alluvial areas, the low Cheviot slopes, Fell Sandstone slopes and till (undifferentiated drift). The alluvial valley floor was divided into areas of alluvial terraces and slightly raised gravel 'islands'. Elsewhere the sand and gravel terraces formed the primary focus as these areas host the highest density of cropmark remains and are most at risk from aggregate extraction. For the purposes of this study the fieldwalking extended from Powburn in the upper reaches of the Till valley (here known as the Breamish) downriver to the terraces and drumlin landscapes of the lower Tweed around Horncliffe (Fig. 3.1). As well as acquiring a record of Stone Age activity on a landscape scale, the fieldwalking also provided an opportunity to link fieldwalking data with specific geomorphological landforms and slope locations (see Chapters 2 and 6), as well as the distribution of crop- and parch-mark sites observed from aerial photographs (see Chapters 6 and 7). The fieldwalking was supported by a targeted programme of test pitting that was driven by the potential to investigate the archaeological associations of different landform elements as well as to prospect for subsurface remains below lithic scatters.

A substantial quantity of material was recovered as a result of the fieldwalking. Out of a total 3436 surface finds, 3340 (97.2%) are lithics, 92 (2.7%) are pottery sherds, two are pieces of slag, and there are one coin and one button. All the pottery consists of small sherds, most of which were body sherds with only the occasional fragment of base, rim and handle, with most belonging to the medieval or post-medieval periods. There was one tiny piece of prehistoric pottery, probably belonging to the Grimston Ware series, from field 22, and two fragments from field 29 that could be late prehistoric or early medieval in date.

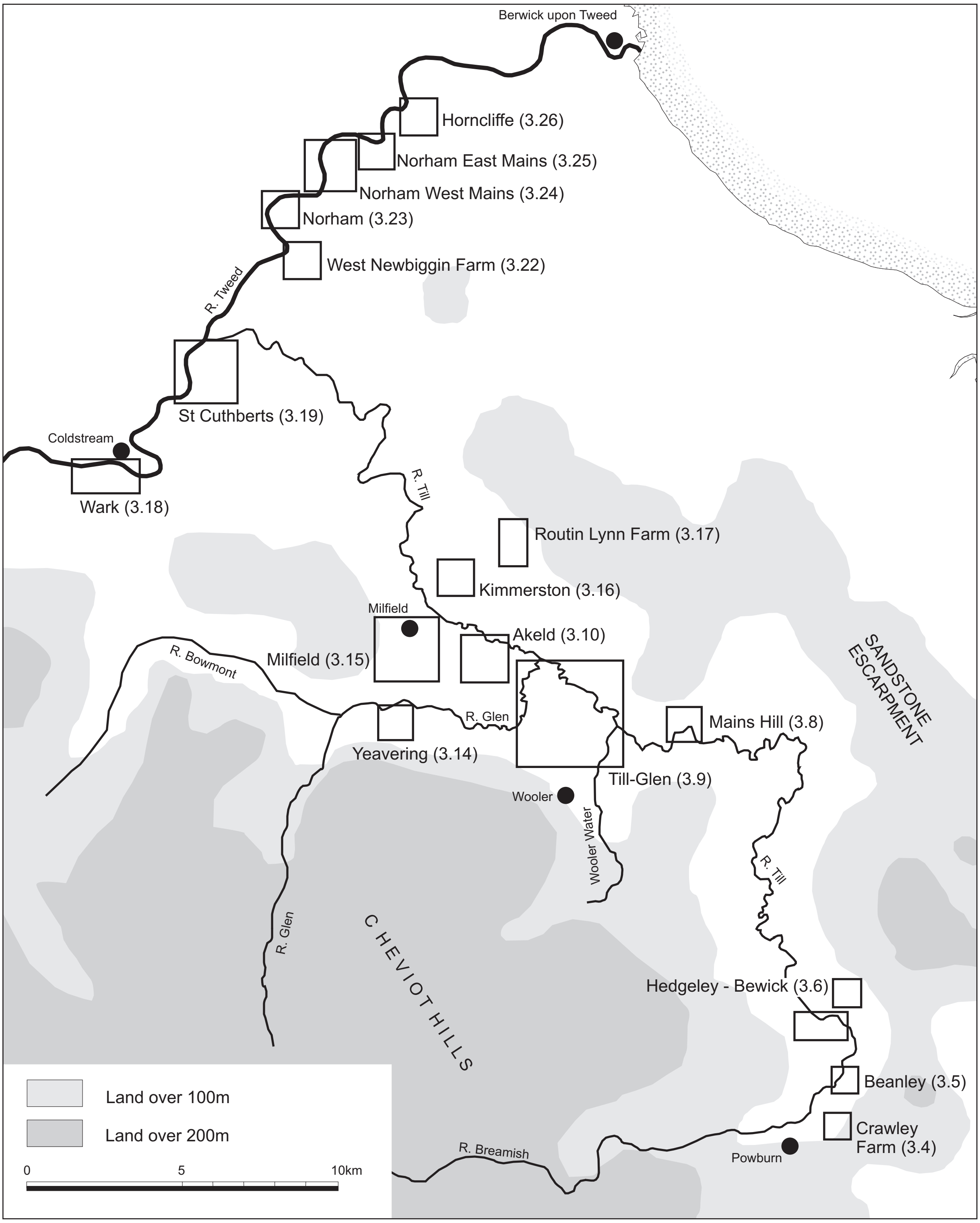


Fig. 3.1. Fieldwalking locales in the Till-Tweed catchment.

METHODS

The fieldwalking was undertaken over several seasons during November/December 1999, March 2000, October/November 2003 and October 2004. All fields were line-walked at 5m intervals (Fig. 3.2) giving a *c.*40% coverage based on the assumption that walkers inspect the ground 1m either side of themselves (Tolan-Smith 1997, 80). The only exceptions to this were fields 15 and 22 which were walked at 2m intervals (*c.*100% coverage) as both these areas were to be fully stripped of their topsoil in advance of aggregate

Fig. 3.2. Fieldwalking across field 11 at New Bewick at 5m intervals.

extraction. All walkers were asked to keep to this range of visibility to ensure consistency throughout the survey. Every find spot was point-referenced with a total station and the field boundaries surveyed so that field plots could be related to the Ordnance Survey grid. Each field was mapped according to slope unit (morphometric mapping) so that each find spot could be ascribed to the type of slope on which it was found. The slope unit categories were based on those devised during a previous fieldwalking project in the region (Waddington 1999, 45–6), which were abstracted from standard slope types identified by Butzer (1982, 58).

Slope type has important implications for the interpretation of surface artefact distributions as geomorphic processes operating on different slope units will affect lithic distribution and retrieval in different ways (Waddington 1999, 85–91; Waddington and Passmore in press). These processes need to be taken into account before meaningful inferences can be made. However, it is noteworthy that in the case of this study many of the fields on the gravel terraces and alluvium were flat, and these experience relatively little artefact movement and redeposition. The purpose of this chapter is to present the results of the fieldwalking and test pitting and consider these in relation to landscape management. The wider archaeological and historical information produced by this work will be explored more thoroughly in the forthcoming companion volume (Passmore and Waddington in prep.).

ASSEMBLAGE CHRONOLOGY

Surface lithic scatter assemblages are usually characterised by their lack of dating control, with only a small fraction of the material collected being chronologically diagnostic. Furthermore, this lack of temporal integrity is compounded by diagnostic lithics being only datable to very broad time periods which usually span several millennia rather than just a few centuries. Therefore, with the few artefacts that are diagnostic only able to be ascribed to periods such as 'Late Mesolithic' or 'Neolithic', the chronology of lithic scatter assemblages is typically very coarse-grained. Most fieldwalking assemblages tend to be an accumulation of material formed over a sustained period as a result of multiple human activities over time. In this sense, fieldwalking assemblages often represent a form of archaeological palimpsest providing a view of often repetitious human behaviour over the *longue durée*. This has important consequences as it predicates, to some extent, the sort of questions that can be asked of the data and the sort of inferences that can be reasonably made. Hence, for the most part the sort of information that can be gained from surface lithic assemblages is pitched on the scale of long-term history rather than that of short-term events. Accordingly it is the broad patterns produced by these largely cumulative records which can provide useful and pertinent insights, particularly within the context of landscape-scale studies.

Occasionally lithic scatters belonging to a specific occupation do occur, as was the case with the lithics recovered from mole hills in a previously ploughed field at Howick (Waddington 2007a). In this case the archaeological deposits from which the flints had been eroded could be accurately dated, demonstrating that the 13,000 plus flints belonged to a *c*.150 year episode of occupation centred on the site of a circular hut dated to around *c*.7800 cal BC. However, in most cases this kind of evidence is unavailable for lithic scatters and therefore it is difficult to test for duration of occupation. Those sites that could be representative of a short or discrete phase of occupation are likely to have lithics diagnostic of one period only, with repetition of the same tool types, together with a reliance on the same raw material source.

There are some possible Palaeolithic pieces in the assemblage, suggesting a much longer time-depth to human occupation in northern England than has previously been thought. Their presence is inferred by a number of diagnostic Mesolithic pieces that have been made by recycling much older chipped flints. These recycled flints are routinely identified as they not only show evidence for having been previously chipped, but they are also very heavily patinated, and in some cases they are beach-rolled, prior to the Mesolithic flaking, the latter observation indicating they have been eroded from underwater deposits before being collected from the coast. This provides proxy evidence for Palaeolithic occupation in areas off what is now the Northumberland coastline, and this key observation supports the recognition of the same phenomenon that has been made in relation to the Mesolithic material from Howick (Waddington 2003; 2007a) and Middle Warren near Hartlepool (Waddington 1996) as well as from other coastal assemblages along the North-East coast (Waddington 2004a). However, a new discovery is that some of the agates that have been recycled as cores also show evidence for previous chipping, having acquired heavy patinas before their re-chipping episode in the Mesolithic. As the agates come from the fluvioglacial gravels of the Milfield plain they indicate the presence of early human groups prior to the end of the Late Devensian when the gravel terraces formed. Moreover, heavily rolled and patinated chipped agates can be found within the gravel beds themselves and these have been regularly picked up by the author during excavations on these surfaces. The presence of this Palaeolithic material in the gravel deposits indicates that human groups also occupied higher areas inland and had not just colonised the lower-lying land under what is now the North Sea Basin. The challenge though is to identify *in situ* Palaeolithic remains in a northern British context. This is hampered of course by landscape taphonomy as not only has much of the favourable habitable land been lost to the sea, but the effects of the ice sheets in the north have been felt more extensively, leaving few areas of landscape untouched. This means that most of the little Palaeolithic material that does survive will exist in secondary, derived contexts such as gravel beds and within till deposits. Perhaps the best places to target for *in situ* material will be caves and underwater locations, whilst early Mesolithic material may be focused around the margins of Post-glacial lake beds and rock shelter locations.

As is typical for many fieldwalking assemblages, the majority of the diagnostic lithics identified in this assemblage belong to the Mesolithic (see Table 3.1). A total of 512 lithics could be characterised as Mesolithic, representing 15.3% of the total assemblage. Of these none could be definitively identified as Early Mesolithic in date, and most were the product of a blade-based manufacturing tradition. However, this does not mean to say that a number of them are not of Early Mesolithic date or perhaps even Late Upper Palaeolithic. As many are made from agate and chert (see below), forms that have yet to be dated in the North-East, it is therefore conceivable that the Mesolithic material spans the full range of the period.

Some of the blade-based lithics clearly belong to either the Mesolithic or Neolithic but are not sufficiently diagnostic to be confidently ascribed to one or other of the periods. These pieces form the 'Mesolithic/Neolithic' group (Table 3.1) which account for 2.3% of the assemblage. Neolithic pieces account

Period	**No. of Diagnostic Flints**	**% of the Assemblage**
Palaeolithic/Early Mesolithic ?	13	0.4%
Mesolithic	512	15.3%
Mesolithic or Neolithic	77	2.3%
Neolithic	29	0.9%
Neolithic/Early Bronze Age	23	0.7%
Early Bronze Age	11	0.3%
Early Modern	3	0.1%
Total	**668**	**20.0%**

Table 3.1. Frequency of datable lithics in the Till-Tweed assemblage (excluding 'possible' attributions except in the case of the Palaeolithic/Early Mesolithic category).

for 0.9% of the assemblage, while Early Bronze Age pieces account for just 0.3%. Those pieces that could belong to either the Neolithic or Bronze Age account for a further 0.7% of the assemblage. Three gun flints account for the early modern pieces of flintwork.

FIELDWALKING RESULTS

Distribution and density

A total of 95 fields was walked, covering a total area of 964.3 ha, together with a small part of an additional field (42) which had to be aborted due to farming interests. All the fieldwalking was carried out at 5m intervals, with the exception of fields 15 and 22 which were walked at 2m intervals, the latter providing 100% surface coverage. The tables below include an adjusted density per hectare column and this gives the density for each field, assuming a 100% surface coverage. For those fields walked at the 5m interval, which equates to a *c*.40% coverage, the actual number of finds is multiplied by 2.5 to give a notional 100% coverage statistic and this number is divided by the area of the field to produce a density per ha statistic. Although the raw counts and densities are also given in the table, this notional 100% coverage statistic is useful as it allows surface densities from all fields within the study to be compared, as well as allowing comparison with other studies from the region where different interval spacings have been used.

Table 3.2 below summarises the results for each field, providing spatial information, density counts, chronological associations and a broad summary of the artefact types found. This table has been constructed in the same format as those used for the original Milfield study (Waddington 1999) and for the Durham Archaeological Survey (Haselgrove and Healey 1992), allowing the results from these different surveys to be compared.

The adjusted densities from this study have a vast range, varying from 0.0 per hectare in fields 49, 96, 97, 106, 108 and 187 to a massive 198.9 per hectare in field 33. However, 43 of the fields produced counts of less than 5.0 per hectare, while 33 produced counts of between 5 and 11 per hectare, a figure which is high in relation to other regional studies in the North-East (see Table 3.3 below), leaving 12 fields with 11–20 lithics per hectare and a further 7 with counts of greater than 20 lithics per hectare. The overall adjusted average for this survey is a count of 9.2 per hectare (Table 3.2) which is high for an inland regional survey. However, we must be cautious with how we interpret this figure as the values for this survey have been substantially depressed by the inclusion of large tracts of alluvial areas where little in the way of surface finds were anticipated (these were targeted largely in order to inform the landscape management study). These alluvial areas account for around 25% of the surface area walked yet they produced less than 5% of the lithics, so by excluding the alluvial areas the adjusted average count for the study would be *c*.11 lithics per hectare, which would indicate a very high density of Stone Age activity in this area (relative to the wider region), comparable to the coastal margin which consistently produces very high counts as a result of the intensity of Mesolithic activity and the close proximity of raw material in the form of beach flint (see Table 3.2 below). This would bear out not only the evidence for Neolithic monuments as provided by the cropmark data (see Chapter 4), but also reflect the obvious attractiveness of this river valley for early human groups. If the alluvial areas are ignored as relatively barren areas then the importance of the sand and gravel terraces and the low Cheviot slopes becomes clear.

The fieldwalking took place around 17 locales in the Till-Tweed catchment (Fig. 3.1). In the Till catchment these locales were centred around Crawley Farm, Beanley, Hedgeley-Bewick, Mains Hill, the confluence of the Till and Glen, Akeld, Yeavering, Milfield village and Kimmerston. In the Tweed catchment the locales were focused around Wark-on-Tweed, St. Cuthberts Farm, West Newbiggin Farm, Norham (Fig. 3.3), Norham West Mains, Norham East Mains and Horncliffe. Table 3.4 below summarises the quantities of lithics, areas covered and the density per hectare for each.

When the lithic densities are related specifically to landform element categories (Table 3.5), the late glacial landforms 1b, 1c and 1d show consistently and markedly higher densities than the other landform element types, with adjusted per hectare densities of 11.5, 7.0 and 17.0 respectively. However, it must be noted that some of these categories, such as undifferentiated drift (1b), are very broad and include sub-glacial landforms such as the drumlinised landscape of the lower Tweed valley as well as Fell Sandstone and Cheviot-derived material on the flanks of their respective massifs, as well as heavy clay tills. As a consequence there is, in actuality, much variation in density counts within this landform category, with the sub-glacial surfaces and hard rock-derived material providing the higher counts and clay tills having very low counts. Not surprisingly it is the flat sand and gravel terraces of the valley floors (1d) that have the highest lithic counts and this supports the conclusions reached as a result of the previous Milfield Basin study (Waddington 1999). These areas also host the highest densities of cropmarks and provide some of the most fertile ground for early agriculture. The areas of bedrock or shallow drift have a noteworthy density of material, indicating perhaps a more specialist interest in these areas during Stone Age times, and the same would appear to be true for the Holocene alluvial valley floor. The fields that straddle the Holocene alluvium

Field	NGR	Parish	Dominant Landform Element	Field Size (ha)	Count per ha (actual)	Count per ha adjusted x 2.5 to 100%	Struck Pebbles	Cores	Flakes	Blades	Retouched/ Utilised Pieces	Other	Periods	Total Lithics
1	NU07101650	Hedgeley	S+G Undi drift 1b	5.1	4.1	10.3		7	9	2	3		mes	21
2	NU07401665	Hedgeley	S+G Undi drift 1b	8.2	0.4	0.9	1		2					3
3	NU07501640	Hedgeley	S+G Undi drift 1b	9.3	2.4	5.9	1	3	13	1	4	1 pot, 1 coin	mes, eba, med, pmed	22
4	NU07101640	Hedgeley	S+G Undi drift 1b	6.8	3.1	7.8		2	6	3	10	2 pot	mes, med	21
5	NU06901635	Hedgeley	S+G Undi drift 1b	3.2	2.8	7.0		2	3	1	3	2 pot	mes, eba, med	9
6	NU06701640	Hedgeley	S+G Undi drift 1b	3.7	3.2	8.1		2	6	1	3	2 pot	mes, med	12
7	NU07651670	Hedgeley	S+G Undi drift 1b	8.7	3.8	9.5		3	19	4	7		mes	33
8	NU08401865	Hedgeley	Ice contact 1c	7.1	3.0	7.4	1	3	10	2	5		mes	21
9	NU05402045	Hedgeley	Ice contact 1c	13.3	3.2	8.1	1	5	21	6	10	1 pot	mes, neo, med	43
10	NU05502075	Hedgeley	Ice contact 1c	12.5	5.4	13.6		7	51	2	8	2 pot	mes, post-med?	68
11	NU06102065	Hedgeley	Ice contact 1c	14.3	1.7	4.4			14	3	8	1 pot	mes, neo/eba, pmed?	25
12	NU05802085	Hedgeley	Ice contact 1c	16.9	1.8	4.4		5	15	3	7		mes, neo, eba	30
13	NU07601845	Hedgeley	Ice contact 1c	7.2	0.8	2.1	1		4		1			6
15	NU03152985	Chatton	S+G Terrace 1d	7.6	5.5	5.5	1	6	16	6	13		pal?, mes, neo?	42
16	NU07652100	Bewick	S+G Undi drift 1b	12.9	7.1	17.8		5	62	7	18	1 pot	mes, neo, pmed?	92
17	NU07352105	Bewick	S+G Undi drift 1b	11.2	2.6	6.5			20	5	4		mes, neo?	29
18	NU05402015	Bewick	Ice contact 1c	14.2	3.1	7.8	1	3	27	2	11		mes, neo, eba	44
19	NU05702000	Bewick	Ice contact 1c	17.6	3.0	7.4		3	34	8	7		mes, neo, early mod	52
20	NU06002000	Bewick	Ice contact 1c	16.2	1.0	2.5		1	7	3	5		mes, neo, eba	16

Table 3.2. Fieldwalking summary by field.

Field	NGR	Parish	Dominant Landform Element	Field Size (ha)	Count per ha (actual)	Count per ha adjusted x 2.5 to 100%	Struck Pebbles	Cores	Flakes	Blades	Retouched/ Utilised Pieces	Other	Periods	Total Lithics
21	NU05002015	Hedgeley	Ice contact 1c	9.3	5.4	13.4		1	32	10	7	2 pot	mes, neo, eba, pmed?	50
22	NT95403130	Akeld	S+G Terrace 1d	32.8	5.1	5.1		22	70	22	52	3 pot	mes, neo, eba, pmed?	166
23	NT94703440	Ford	S+G Terrace 1d	16.0	2.6	6.4		4	27	2	8	2 pot	mes, neo/eba, pmed?	41
24	NT95903520	Ford	Undiff drift 1b	20.6	1.8	4.6		2	23	1	12	2 pot	mes, neo?, med?	38
25	NT95803040	Akeld	Hol Alluvium 2b	4.9	1.0	2.7		3	5	1	4		mes, ba?	13
26	NT84503825	Carham	Hol Alluvium 2b	5.7	8.2	20.6	1	3	35	4	4	1 pot	mes, post-med?	47
27	NT84253830	Carham	Hol Alluvium 2b	13.3	1.4	3.6			15		4	3 pot	mes, med, pmed	19
28	NT83953850	Carham	Hol Alluvium 2b	12.8	2.6	6.4		4	24	2	3	1 pot, 1 button	pal?, mes, pmed, mod	33
29	NT83203850	Carham	S+G Terrace 1d	17.1	11.0	27.5	1	19	118	20	30	3 pot	mes, neo?, med, pmed	188
30	NT87054225	Cornhill	Undiff drift 1b	5.6	2.3	5.8		2	7	1	3	1 pot	mes, neo?, eba?, med?	13
31	NT92703035	Kirknewton	Undiff drift 1b	11.0	2.7	6.8		10	12	1	7		mes	30
32	NT86904245	Cornhill	Undiff drift 1b	16.0	14.1	35.3		19	126	54	27		mes, neo?	226
33	NT86904245	Cornhill	Undiff drift 1b	6.8	79.6	198.9	1	39	378	82	41		mes, neo?	541
34	NT82003860	Carham	S+G Terrace 1d	9.7	11.4	28.6		9	72	15	15		mes, neo	111
35	NT82903810	Carham	Ice contact 1c	8.1	3.5	8.6		1	14	8	5		mes	28
36	NT82533820	Carham	Undiff drift 1b	5.7	1.6	3.9		2	5		2		mes	9
37	NT90304520	Norham	Undiff drift 1b	8.6	4.7	11.8	3	6	21	5	5		pal/mes, mes, eneo	40
38	NT90204540	Norham	Undiff drift 1b	10.9	2.5	6.3		2	15	2	8		pal, mes	27
39	NT89804530	Norham	Undiff drift 1b	11.8	3.1	7.8		6	20	5	6		pal/mes, mes/neo	37

Table 3.2 cont. Fieldwalking summary by field.

Field	NGR	Parish	Dominant Landform Element	Field Size (ha)	Count per ha (actual)	Count per ha adjusted x 2.5 to 100%	Struck Pebbles	Cores	Flakes	Blades	Retouched/ Utilised Pieces	Other	Periods	Total Lithics
40	NT90404490	Norham	Undiff drift 1b	6.2	0.7	1.8			3		1			4
41	NT89404730	Norham	S+G Terrace 1d	10.1	4.7	11.8	1	4	30	3	9	22 pot	mes, med	47
42	NT91054660	Norham	S+G Terrace 1d	Field Aborted				1	2		1			4
43	NT89804750	Norham	S+G Terrace 1d	4.7	0.2	0.5			1			8 pot	post-med	1
44	NT91704740	Norham	Undiff drift 1b	14.0	2.5	6.3		11	13	2	9		pal?, mes, neo	35
45	NT91104610	Norham	Undiff drift 1b	17.6	3.4	8.5		11	31	7	11		pal?, mes, neo, emed, pmed	60
46	NT91104770	Horncliffe	Undiff drift 1b	11.4	0.0	0.0								0
47	NT91204780	Horncliffe	Undiff drift 1b	8.6	3.5	8.8	1	10	8	2	9	5 pot	mes, med	30
48	NT91004810	Horncliffe	Undiff drift 1b	10.6	2.5	6.3	1	3	14	4	4	2 pot	mes, med	26
49	NT90804910	Horncliffe	Hol Alluvium 2b	7.0	0.0	0.0								0
50	NT91204940	Horncliffe	Hol Alluvium 2b	15.5	0.2	0.5			2		1	1 pot	mes/neo, med	3
51	NT91504850	Horncliffe	Undiff drift 1b	15.6	0.9	2.3	1	1	9		3		mes, mes/ neo	14
52	NT89604730	Norham	S+G Terrace 1d	2.0	2.5	6.3		2	3			11 pot	mes, med, post-med	5
53	NT89504750	Norham	S+G Terrace 1d	5.9	0.8	2.0			5			1 slag		5
54	NT89304700	Norham	S+G Terrace 1d	9.6	16.0	40.0	1	32	75	19	26	1 slag	mes, neo, eba? med	153
55	NT92704930	Horncliffe	Undiff drift 1b	9.0	3.7	9.3		5	22	2	4		mes, neo/eba	33
56	NT92304920	Horncliffe	Undiff drift 1b	7.3	0.8	2.0			6					6
57	NT92504880	Horncliffe	Undiff drift 1b	8.1	1.5	3.8	1	2	5	2	2		mes	12
58	NT92104930	Horncliffe	Hol Alluvium 2b	6.0	3.2	8.0		2	12	1	4		mes, eba	19

Table 3.2 cont. Fieldwalking summary by field.

Field	NGR	Parish	Dominant Landform Element	Field Size (ha)	Count per ha (actual)	Count per ha adjusted x 2.5 to 100%	Struck Pebbles	Cores	Flakes	Blades	Retouched/ Utilised Pieces	Other	Periods	Total Lithics
59	NT92904880	Horncliffe	Undiff drift 1b	5.0	1.0	2.5	1	1	2		1		mes	5
60	NT94305000	Horncliffe	Undiff drift 1b	12.9	1.5	3.8		6	6	4	3		mes, eba	19
90	NT930334	Milfield	Undiff drift 1b	3.93	5.3	13.3	2	4	12		3		ba, mes	21
91	NT932333	Milfield	Undiff drift 1b	9.22	6.6	16.5	1	13	42		5	gun flint	mes, early mod	61
92	NT928332	Milfield	Undiff drift 1b	9.69	5.8	14.5	8	13	29	3	3		mes	56
93	NT932330	Milfield	Undiff drift 1b	6.58	6.1	15.2	2	17	10	3	8		mes, neo	40
94	NT935332	Milfield	S+G Terrace 1d	10.43	5.3	13.3	3	11	28	4	9		mes	55
95	NT939335	Milfield	S+G Terrace 1d	8.1	11.5	28.8	7	26	42	5	13		mes	93
96	NT990312	Doddington	Hol Alluvium 2b	14.75	0	0								0
97	NT985313	Doddington	Hol Alluvium 2b	21.39	0	0								0
98	NT999318	Doddington	Sandstone 1a	5.67	3.5	8.8	2		16		2			20
99	NT996317	Doddington	Sandstone 1a	21.12	0.7	1.7	1		8	1	1		eba	11
100	NT994319	Doddington	Hol Alluvium 2b	5.72	0.3	0.8			2					2
101	NT999301	Doddington	Hol Alluvium 2b	7.95	0.1	0.3			1					1
102	NT999305	Doddington	Hol Alluvium 2b	11.74	0.3	0.8			3		1			4
103	NT996305	Doddington	Hol Alluvium 2b	17.7	0.1	0.3		1	1				mes	2
104	NT976306	Ewart	Alluv/Grav 2b/1d	8.27	1.7	4.3		6	6		2		mes	14
105	NT976303	Ewart	Alluv/Grav 2b/1d	7.49	2.3	5.8	1	3	8	2	3		mes	17
106	NT973313	Ewart	Hol Alluvium 2b	5.56	0	0								0
107	NT974316	Ewart	Hol Alluvium 2b	4.19	1.2	3			3		2		mes	5

Table 3.2 cont. Fieldwalking summary by field.

Field	NGR	Parish	Dominant Landform Element	Field Size (ha)	Count per ha (actual)	Count per ha adjusted x 2.5 to 100%	Struck Pebbles	Cores	Flakes	Blades	Retouched/ Utilised Pieces	Other	Periods	Total Lithics
108	NT977318	Ewart	Hol Alluvium 2b	12.39	0	0								0
109	NT977368	Ford	Sandst. undif 1b	5.64	6.4	16		6	28	2			mes	36
110	NT962362	Ford	Sandst. undif 1b	8.42	2.6	6.5	1	1	18		2		mes	22
111	NT971365	Ford	Sandst. undif 1b	5.96	3.5	8.8	2	4	13		2		mes	21
112	NT969369	Ford	Sandst. undif 1b	3.63	2.2	5.5		2	4	1	1		mes	8
113	NT970367	Ford	Sandst. undif 1b	3.83	5.7	14.3	3	3	14	1	1		mes	22
114	NT974369	Ford	Sandst. undif 1b	5.32	3.8	9.5	2	3	15				mes	20
115	NT974367	Ford	Sandst. undif 1b	4.89	1.6	4	1	1	6				mes	8
116	NT975365	Ford	Sandst. undif 1b	6.98	0.7	1.8		2	3				mes	5
117	NT961344	Doddington	Undiff drift 1b	13.68	1.4	3.5		4	9	1			mes	14
118	NT965345	Doddington	Undiff drift 1b	10.95	0.9	2.3		1	8		1		mes	10
127	NT977313	Ewart	Hol Alluvium 2b	10.3	0.3	0.8	1		2					3
130	NT983306	Wooler	Alluv/Grav 2b/1d	11.08	1	2.5	2	1	6	2			mes	11
132	NT985303	Wooler	Alluv/Grav 2b/1d	13.89	1.7	4.3	1	3	9	7	4		mes, neo, early mod	24
133	NT983301	Ewart	Alluv/Grav 2b/1d	18.08	0.1	0.3			2					2
137	NT988300	Wooler	Alluv/Grav 2b/1d	14.97	0.1	0.3		1	1				mes, neo	2
185	NT990297	Wooler	Alluv/Grav 2b/1d	9.82	0.2	0.5		1	1				mes	2
186	NT992297	Wooler	Alluv/Grav 2b/1d	9.41	0.1	0.3	1							1
187	NT994297	Wooler	Alluv/Grav 2b/1d	5.74	0	0								0
Total				**964.3**	**av. 3.74**	**av. 9.2**	**61**	**429**	**1957**	**372**	**521**			**3340**

Table 3.2 cont. Fieldwalking summary by field.

Project/Location	Average Adjusted (100%) Density per hectare	Reference
Coastal Surveys		
Maiden's Hall, Northumberland coast	51.8	Archaeological Practice 2001
East Durham and Cleveland coast	13.0	Haselgrove and Healey 1992, 6
Howick, Northumberland coast	11.9	Waddington 2007
Middle Warren, Durham coast	11.8	Archaeological Practice 1996, 5
Turning the Tide, Durham coast	10.9	ASUD 1998
Inland Surveys		
Lower Tyne Valley	10.0	(calculated from) Tolan-Smith 1997, 82
Middle Tees Valley	3.1	Haselgrove and Healey 1992, 14
East Durham Plateau	0.6	Haselgrove and Healey 1992, 4
Tees Lowlands	0.3	Haselgrove and Healey 1992, 13
Wear Lowlands	0.3	Haselgrove and Healey 1992, 3

Table 3.3. Lithic counts per hectare from other North-Eastern fieldwalking surveys.

Locale	No. Fields	Area (ha)	Total No. Lithics	Density per ha	Density per ha adjusted to give notional 100% coverage (Total X 2.5)
Crawley Farm	7	45.0	121	2.7	6.7
Beanley	2	14.3	27	1.9	4.7
Hedgeley-Bewick	10	138.4	449	3.2	8.1
Mains Hill	1	7.6	42	5.5	13.8
Till-Glen	21	237.2	121	0.5	1.3
Akeld	2	37.7	179	4.7	11.8
Yeavering	1	11	30	2.7	6.8
Milfield Village South	6	47.9	326	6.8	17.0
Kimmerston	2	36.6	79	2.2	5.4
Roughting Lynn	10	69.3	166	2.4	6.0
Wark-on-Tweed	7	72.4	435	6.0	15.0
St. Cuthberts	3	28.4	780	27.5	68.7
West Newbiggin	5	55.1	168	3.0	7.6
Norham	5	32.3	211 (excl 4 from field 42)	6.5	16.3
Norham East Mains	7	82.7	108	1.3	3.3
Norham West Mains	5	35.3	75	2.1	5.3
Horncliffe	1	12.9	19	1.5	3.7

Table 3.4. Densities by fieldwalking locale.

and upstanding gravel 'islands' at the glaciodeltaic margin of the Milfield Basin provide the lowest counts per hectare but this disguises the fact that there is a virtual absence of material from the Holocene areas but distinct clusters of stone tools on the upstanding gravel islands. This pattern of activity is discussed in more detail below, but at this point it serves to note the activities represented by these lithic spreads are very likely to relate to specialist uses of these unique landscape locales. This has been supported by the identification of a sub-surface feature on one of these islands and its subsequent dating to the Early Neolithic (see below).

The following maps (Figs 3.4–3.26) show the location of each locale, the fields walked, the lithic findspots and their relationship to nearby cropmark sites. The maps use a dashed line to delimit the areas fieldwalked and cropmark sites are shown in a light grey shade with upstanding banks shown as a mid-grey shade. Plots showing the findspots and slope mapping in each field are contained in the project archive.

Crawley Farm (Fields 1–7)

The area around Crawley Farm is located on high ground south of the River Breamish above Powburn (Fig. 3.4). The ground slopes away from a high point of 160m to plateau areas between 140m and 150m. This block of land is formed from glaciofluvial undifferentiated drift that has been modified by subsequent fluvial action. The artefact scatters on this local upland were densest in fields 1 and 7, which had lithic densities of 10.3 and 9.5 artefacts per hectare respectively.

Fig. 3.3. Fieldwalking next to a deserted medieval village site at Norham.

Landform Element	No. Fields	Area (ha)	Total No. Lithics	Density per ha	Density per ha adjusted to give notional 100% coverage (Total X 2.5)
1a Bedrock with discontinuous shallow drift cover (Late Devensian)	2	26.79	31	1.2	3.0
1b Undifferentiated Late Devensian glacial and glaciofluvial drift	50	391.12	1791	4.6	11.5
1c Late Devensian ice-contact meltwater deposits	11	136.7	383	2.8	7.0
1d Late Devensian glaciofluvial and glaciodeltaic terraces	12	134	911	6.8	17.0
2b Holocene alluvial terraces and floodplain deposits (pre-nineteenth century)	17	176.9	151	0.9	2.3
Mixture of 1d and 2b	9	98.75	73	0.7	1.8

Table 3.5. Lithic densities related to the dominant landform elements in a given field.

Of particular note, however, was a concentration of material in the western half of field 3 around an ancient streambed. The streambed was recognisable as a linear depression on the ground surface extending to a currently active stream set in a very steeply incised valley. The streambed also had a much darker organic soil along its length compared to the surrounding light brown soil in the rest of the field. A concentration of lithic material was identified around this old streambed and included scrapers and cores belonging to the Mesolithic. It is a common feature of this study that ancient wetlands form foci for Mesolithic stone tool clusters, highlighting the importance of riparian environments for hunter-gatherer groups.

The lithic material from this area included many artefacts made from agate and chert as well as those made from flint. Most of the datable material belongs to the Mesolithic but an unexpected Early Bronze Age component was also evident. This was identified by the presence of two fine thumbnail scrapers made

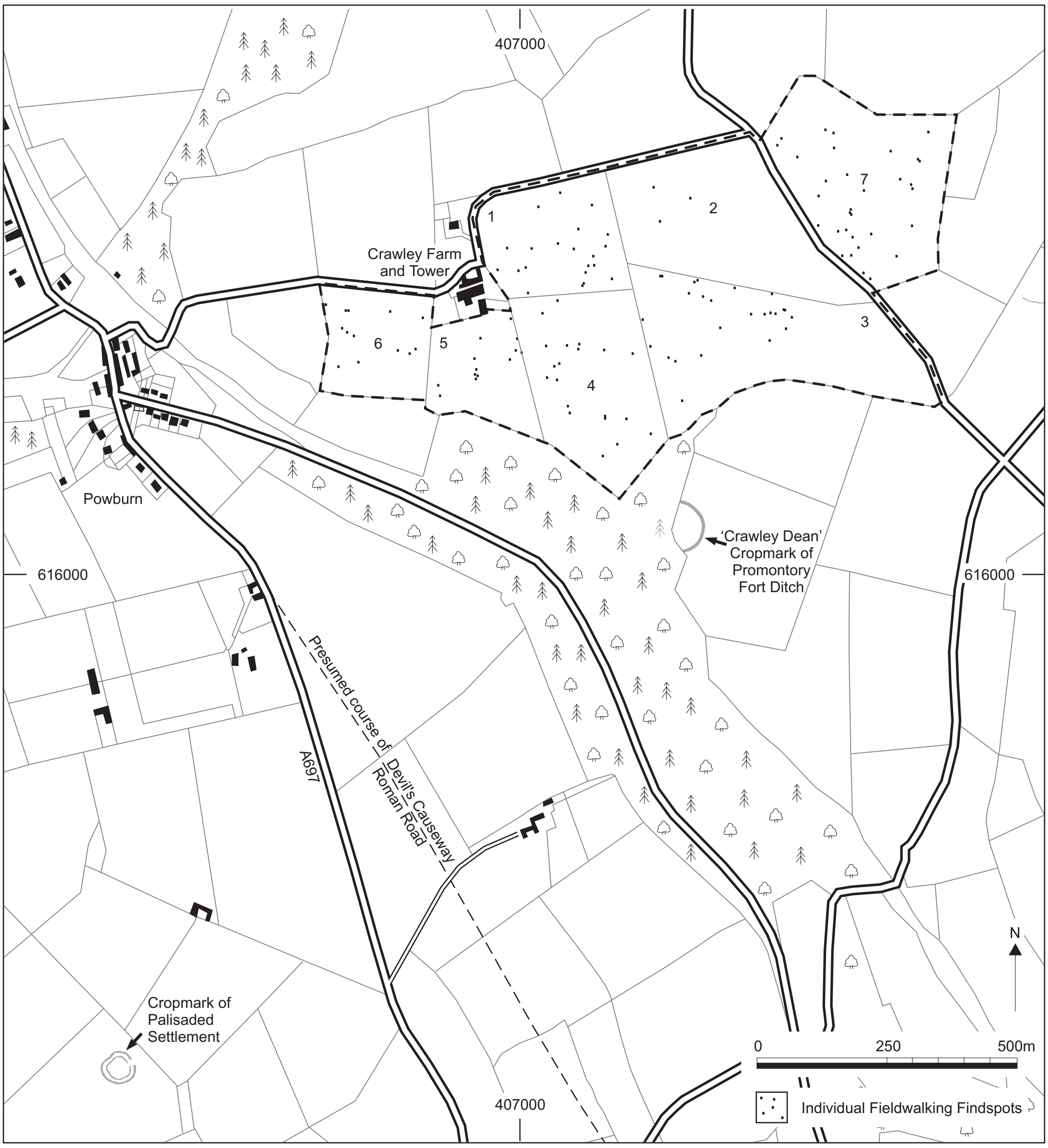


Fig. 3.4. Crawley Farm fieldwalking findspots (fields 1, 2, 3, 4, 5, 6 and 7).

from high-quality flint (Fig. 3.31, 217 and 277) as well as an edge-trimmed flake (Fig. 3.30, 229) and other probable Bronze Age scrapers (e.g. Fig. 3.31, 144). Thumbnail scrapers are sometimes found in Beaker burials; being positioned on a prominent ridge it is possible that these artefacts may have come from ploughed-out burials. Alternatively they could indicate Early Bronze Age settlement in this area. Some medieval pottery was found in these fields together with a coin from field 3. This material no doubt relates to the occupation of Crawley Tower, a defended towerhouse now occupied in part by Crawley Farm.

Beanley (Fields 8 and 13)

The two fields surveyed at Beanley were located closer to the valley floor than those at Crawley Farm, lying between 75m and 120m above Ordnance Datum (Fig. 3.5) on sand and gravel terraces (1c). Field 8 had quite a high concentration of material overall, having an adjusted lithic count per hectare of 7.4. In comparison field 13 was very low, having an adjusted density of just 2.1. All the diagnostic material from field 8 was Mesolithic and included a high proportion of tools that included edge-trimmed blades and flakes. Field 8 extended over a series of gravel terraces separated by steep scarps with the high ground at the south-east end of the field, and it was on those higher terraces that most of the Mesolithic material was discovered. Immediately adjacent to these terraces, and forming the south-east to north-west edge of Field 8, is an area of wetland that may have constituted one of the primary attractions of this locale for Mesolithic groups.

Fig. 3.5. Beanley fieldwalking findspots (fields 8 and 13).

Hedgeley-Bewick (Fields 9–12 and 16–21)

The fields between Hedgeley and Bewick form one of the largest fieldwalking blocks in this survey and, with the exceptions of fields 16 and 17, are positioned on a large dissected gravel terrace that has formed as ice-contact meltwater deposits (landform element 1c with some 1d), with extensive level areas defined by steep scarp edges containing relict ice-wastage features in the form of infilled kettle holes and others that still contain standing water (Fig. 3.7). Some of these latter features appear to be directly associated with past human land use and settlement, as cropmarks of a boundary feature show an entrance way facing the standing water in a kettle hole in field 12. The implication is that this pool of standing water was used as a watering hole for stock. Elsewhere a lithic scatter that included Mesolithic material was observed associated with an infilled kettle hole in field 18 and another scatter with Mesolithic material was observed around a kettle hole in field 19 that still contains standing water today. Mesolithic material including a backed blade 'narrow blade' microlith, was found across the entire area, suggesting that hunter-gatherer groups found this area of free-draining terraces set back from the river attractive for settlement.

The cropmark evidence for this terrace area is particularly impressive and includes a series of pit features in field 9, together with linear boundary features that extend into the surrounding fields (Fig. 3.6). There is also a ring ditch feature in field 18, as well as *Grubenhaüser* in field 11. It is interesting to note that a Neolithic component was recognised in

Fig. 3.6. Hedgeley and New Bewick fieldwalking findspots (fields 9, 10, 11, 12, 16, 17, 18, 19, 20 and 21).

Fig. 3.7. Kettle hole in Field 12 with Old Bewick Hill in the background.

the assemblage from field 9 and it is thought likely that this material relates to the pit features identified on the aerial photographs in this same field. Clusters of Neolithic pits have been found elsewhere on the gravel terraces in this river system such as those sites at Cheviot Quarry North, Cheviot Quarry South (Johnson and Waddington in press), Coupland (Waddington 1999), Thirlings (Miket 1987), Lanton Quarry (Waddington and Johnson in press) and Yeavering (Hope-Taylor 1977). A particularly fine end scraper made from high-quality flint was recovered from field 9 in pristine condition (Fig. 3.31, 428), suggesting that the ploughing of this area continues to disturb finds from buried and truncated archaeological features. A leaf-shaped arrowhead was found in field 20 (Fig. 3.32, 874) while retouched blades were found in fields 9 (Fig. 3.30, 421), 12, 16, and 21 (Fig. 3.30, 914 and 990), and Neolithic scrapers in field 11. It seems that much of the flat ground forming the top of this terrace was utilised as an area of settlement in Neolithic, and probably also Early Bronze Age, times.

Bronze Age activity is evidenced in this area not only by the presence of the ring ditch feature in field 18 but also by a barbed and tanged arrowhead (Fig. 3.32, 769) that was found immediately next to a small infilled kettle hole that extends below the modern road at the northern edge of the field. In fields 11 and 20 some thumbnail scrapers that are most likely to be of Bronze Age date were also recovered (Fig. 3.31, 536), together with an arrowhead tip from field 20, and a broken arrowhead segment from field 19, both being either Neolithic or Bronze Age in date.

Evidence for early medieval settlement is known in this area from the cropmark evidence for sunken featured buildings (*Grubenhaüser*) and the subsequent excavation of one of these sites by Gates and O'Brien (1988). A few isolated fragments of medieval and post-medieval pottery were recovered from fields 9, 10, 11 and 16.

Fields 16 and 17 are located on the steeply sloping hillside below Old Bewick hillfort and comprise Fell Sandstone-derived undifferentiated drift. Field 16 produced a high density of lithics, giving an adjusted count per hectare of 17.8 compared to 6.5 for field 17. Concentrations of material can be identified in field 16, particularly around localised areas of level ground on the slope. Whether this is the result of slopewash processes transporting material on to these flat areas, or a reflection of the location of past human activities, remains uncertain. Most of the material on the steep slopes consists of artefacts that are in the process of being moved downhill. Therefore, their presence is a reflection of past activity that took place higher up the slope at the base of the crags upon which Old Bewick hillfort stands. This is a commanding location and the Old Bewick hilltop commands panoramic views across the valley to the Cheviots. Cup and ring marked rocks are located on the top of Old Bewick Hill together with stone cairns. A Grimston Ware series bowl, now in the British Museum, is likely to have come from one of these cairns so there is clear evidence for Neolithic activity in this area of landscape. Some of the lithics from field 16 are likely to be Neolithic in date while others are clearly Mesolithic.

Mains Hill (Field 15)

The fieldwalking in field 15 at Mains Hill near Horton encompassed two areas: one in an area designated for gravel extraction (landform element 1d) on the top of a bluff overlooking a natural crossing point of the River Till, and a second on a flat area of alluvial river terrace below (landform element 2b) (Fig. 3.8) intended for use as a stocking area. Lithic tools typical of the Mesolithic period were recovered from the area on the gravel bluff with concentrations recognisable on the eastern, more sheltered, side. A small number of undiagnostic lithics were recovered from the lower area and were widely spread. The lithics from the latter area are likely to have arrived in their respective locations as a result of slopewash and are unlikely to represent sub-surface archaeology, particularly as this area is alluviated.

Analysis of aerial photographs shows the existence of a possible Roman temporary camp in the fields immediately east of the extraction area (Miket 1987). This corresponds with the Ordnance Survey's suggested course of the Roman road known as the Devil's Causeway. It is likely that the course of the road ran directly through the area designated for extraction. No surface trace of this road could be observed although there is a natural hollow on the ridge that may have been exaggerated by its use as a roadway.

Till-Glen (Fields 96–108, 127, 130, 132, 133, 137, 185, 186 and 187)

The fieldwalking in this area encompassed a group of 18 fields in the alluvial floodplain between the rivers Till and Glen in the heart of the Milfield Basin (largely

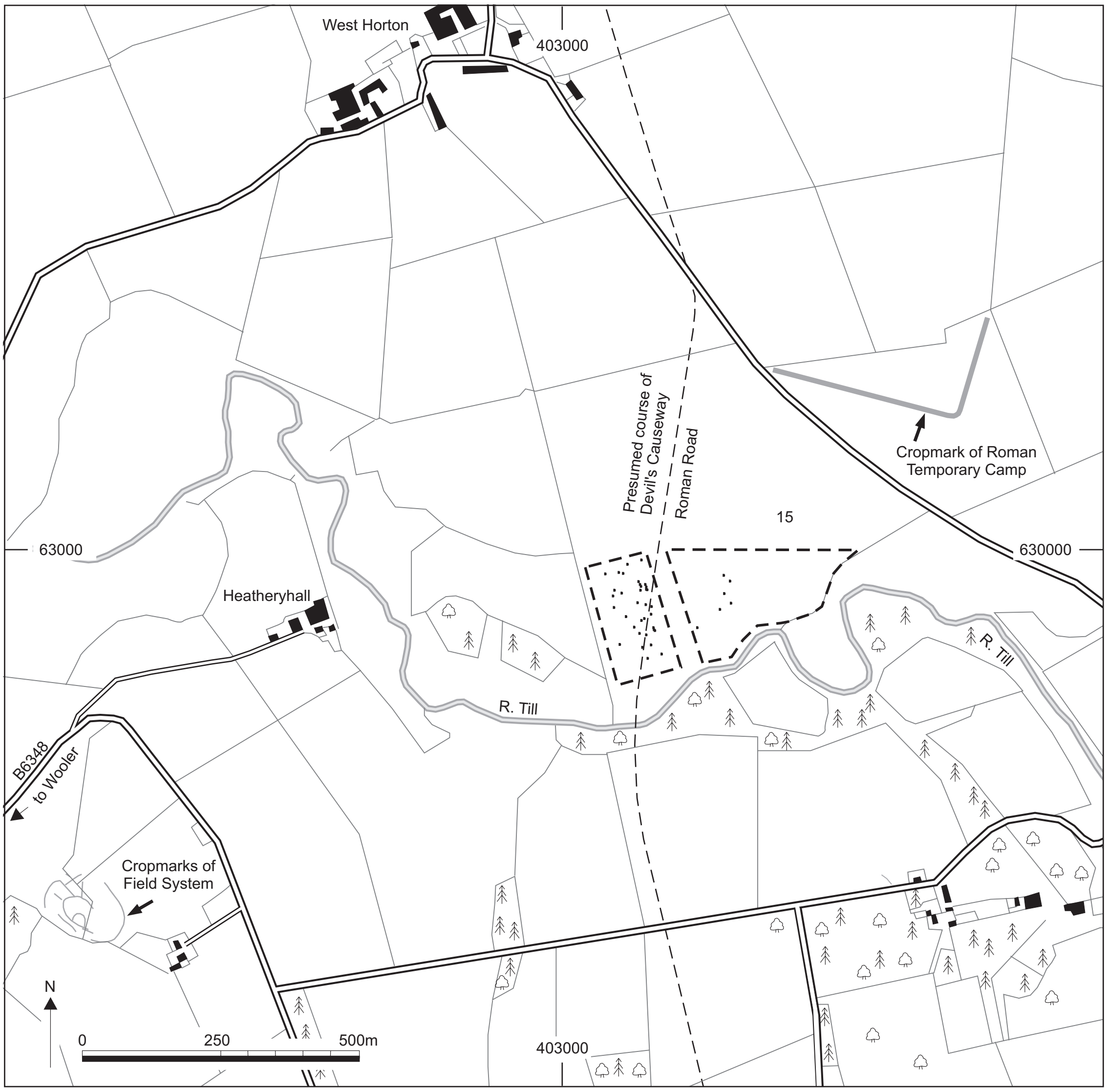


Fig. 3.8. Mains Hill fieldwalking findspots (field 15).

landform element 2b) and a further three fields on the more steeply sloping Fell Sandstone-derived undifferentiated drift (largely landform element 1b) to the immediate south of Doddington on the east side of the River Till (Fig. 3.9). The fields within the floodplain area include the intercalated alluvial and fluviodeltaic sand and gravel terrace deposits that feather into each other at the margin of the gravel fan that extends out from the mouth of Glendale. In some fields there are upstanding gravel areas emerging above the surrounding Holocene alluvium (e.g. fields 104, 105, 107, 132 and 137), producing localised gravel 'islands' within what is an otherwise largely alluviated area. The lithic counts from the areas of Holocene alluvium are zero to low on the low terraces such as fields 96 and 97, but the potential of the higher alluvial terraces for hosting Stone Age archaeology is demonstrated by fields 102, 103 and 104 that produced counts of 0.1–0.3 lithics per ha, although these are clearly very low densities. In stark contrast, were the raised gravel islands that showed evidence for the clustering of Stone Age activity. Although the overall field densities for these fields are still relatively low, the patterning on the ground shows that the finds in these fields were concentrated on the higher gravel areas and were absent from the alluvial areas except where material had been moved down from the gravel islands by the plough.

Most of the lithic material from these fields that could be categorised belongs to the Mesolithic period, although there was a parallel blade component in field 132 that was equally consistent with Early Neolithic chipped stone traditions. For hunter-gatherer-fisher groups these raised areas amongst the floodplain wetlands appear, not surprisingly, to have formed attractive locales for resource procurement activities, whether this included fishing and fowling or the collection of reed, plant foods and so forth. In addition, the

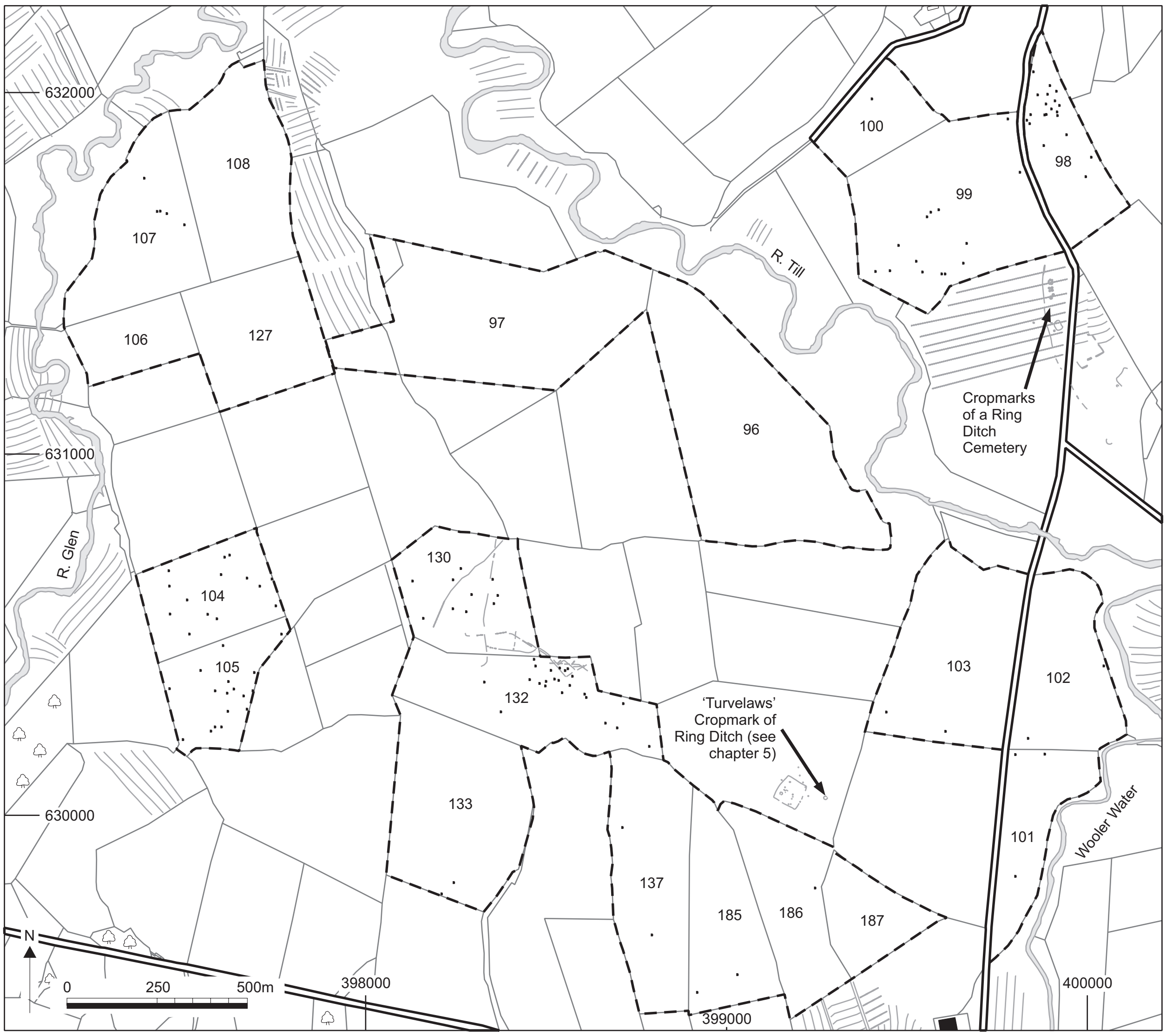


Fig. 3.9. Till-Glen fieldwalking findspots (fields 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 127, 130, 132, 133, 137, 185, 186, 187).

test pit results (see below) revealed the presence of Early Neolithic structural features on one of the raised gravel areas below a lithic scatter. Together with the lithic evidence this survey has shown for the first time that the floodplain areas of the Milfield Basin have the potential to host archaeological remains dating back to the Early Holocene. However, the alluvial areas proper appear to have less potential as these genuinely appear to be less favoured areas, while the lowest alluvial terraces, being considerably younger in date, have no known potential for hosting archaeological remains of such antiquity.

A programme of test pitting was undertaken over the Till-Glen survey block in order to gain a better understanding of the sedimentary sequence, the geomorphological processes and surface-subsurface relationships across the Holocene alluvium and the fluviodeltaic sand and gravel 'islands'.

All test pits were excavated down to the natural drift deposits except where these were over a metre below the surface when the test pits were then cored from their base to identify the sedimentary sequence below that level. Each pit was excavated as a 1x1m square in 0.1m spits, with the entire contents of each spit sieved through a 5mm mesh in order to maximise finds recovery. Test pits were positioned in small clusters on different landform elements that included raised alluvial terraces (landform element 2b), low alluvial terraces (landform element 2b), alluvial gravel islands (landform element 1d), and a depression and a palaeochannel, both on alluvial terraces (landform elements 2c). Another consideration taken into account when siting the test pits was the location of the artefact scatters identified by the fieldwalking. More specifically, this meant some test pits were targeted around field 132 and also around fields 104/105, together with some in field 107 where concentrations of material had been identified on the gravel islands. Test pits were sited so that areas both on and off the gravel 'islands' were investigated.

A total of 24 test pits was excavated in this survey block, producing 21 lithics (Table 3.6). However, only six of the 24 pits produced lithics (24%). This compares with an average of 42% of test pits producing lithics across the other geological areas of the basin in an earlier study (Waddington 1999, 78). All of the six pits that produced lithics were located on either the high alluvial terraces or the gravel islands – both areas where minimal alluviation has taken place since the Early Holocene. None of the test pits on the lower alluvial terraces produced any lithics. This is probably partly a result of the burial of artefacts by the accumulation of sediments throughout the Holocene but as the test pits allowed sampling of these sediments at depth, the implication, based on this small sample, is that the pattern visible on the surface may be a reasonable reflection of the actual intensity of past occupation on these areas, at least during the Stone Age.

The landform element with the highest number of lithics per pit (average 3.3) was the sand and gravel island in field 132 (landform element 1d). As these terraces would offer a free-draining environment amongst otherwise boggy land at risk from perennial flooding, these locales would have provided an obvious attraction to early human groups. The other areas that produced lithics, though at a reduced density, were raised alluvial terraces (average 0.4 per pit). These terraces were also less prone to flooding as they occupied the highest locations across the alluvial basin. However, the soils are slightly wetter and more water retentive than the alluvial gravel islands, as well as being more prone to flooding.

Elsewhere across the floodplain, the lower alluvial terraces, the depression and the palaeochannel produced only one lithic, together with a piece of modern pottery from spit 1 in pit 10,167 and a small sherd of Romano-British pottery came from spit 5 in pit 10,172, both on low alluvial terraces. The depth at which the Romano-British pot sherd was found (0.5m) indicates that burial of archaeological remains has taken place across parts of the Holocene valley floor as a result of alluvial processes. In addition a large flint flake was discovered in spit 6 (0.5–0.6m) in pit 10,160 on an alluvial gravel island from within an alluvial veneer that overlay the natural sand and gravel sediments, indicating that burial of archaeological remains had taken place here also, albeit to a lesser extent. The implication, therefore, is that archaeological remains are buried within the Holocene valley floor, although it is the raised areas, sometimes with a thin alluvial veneer overlying them, which have produced this evidence. Although burial of archaeological and palaeoenvironmental deposits elsewhere across the valley floor is to be expected, it is the raised areas that are most at risk from ploughing and soil erosion, as the buried archaeology is nearer to the surface. It is also probable that these were the areas most favoured for activity by previous inhabitants of the basin as mentioned above.

During the excavation of test pit 10,155 on the gravel island in field 132, a truncated stakehole feature with a charred stake tip was observed cut into the gravel surface. The dating results from the charred material are of considerable interest. Two fragments of oak heartwood were submitted for assay by the AMS method, returning dates of 3820–3650 cal BC (4975±45BP; OxA-10696) and *c*.3650–3500 cal BC (4780±45BP; OxA-10697). Although these determinations were taken on oak heartwood and could be affected by the 'old wood effect', the broad dating of the material to the first half of the 4th millennium cal BC serves to demonstrate the presence of Early Neolithic archaeological remains below a lithic scatter in a part of the floodplain where no previous evidence for prehistoric activity had been recognised. This area in field 32 was originally selected for fieldwalking on

Pit No.	Field No.	Landform Element of Field	No. Lithics	No. Pot	Spit No.	Soil Horizon
10,150	132	Sand & Gravel Terrace 1d	1		1	Ploughsoil
10,151	132	Sand & Gravel Terrace 1d	1		1	Ploughsoil
10,152	132	Sand & Gravel Terrace 1d				
10,153	132	Sand & Gravel Terrace 1d	4		2	Ploughsoil
			1		3	Ploughsoil
10,154	132	Sand & Gravel Terrace 1d	1		2	Ploughsoil
			4		3	Ploughsoil
10,155	132	Sand & Gravel Terrace 1d	4		1	Ploughsoil
			4		2	Ploughsoil
10,156	137	Sand & Gravel Terrace 1d				
10,157	137	Sand & Gravel Terrace 1d				
10,158	137	Sand & Gravel Terrace 1d				
10,159	190	Alluvial Terrace				
10,160	104	Holocene Alluvium & Gravel Terrace 1d & 2b	1		6	Subsoil
10,161	104	Holocene Alluvium & Gravel Terrace 1d & 2b				
10,162	104	Holocene Alluvium & Gravel Terrace 1d & 2b		1 glass	5	Subsoil
10,163	120	Holocene Alluvium & Gravel Terrace 1d & 2b				
10,164	120	Low Holocene Alluvial Terrace 2b				
10,165	120	Low Holocene Alluvial Terrace 2b				
10,166	119	Low Holocene Alluvial Terrace 2b				
10,167	119	Low Holocene Alluvial Terrace 2b		1	1	Ploughsoil
10,168	119	Depression on Alluvial Flat 2c				
10,169	125	Holocene Alluvium 2b				
10,170	122	Palaeochannel on Holocene Alluvium 2c				
10,171	107	Holocene Alluvium & Gravel Terrace 1d & 2b				
10,172	107	Holocene Alluvium & Gravel Terrace 1d & 2b		1	5	Subsoil
10,173	107	Holocene Alluvium 2b				

Table 3.6. Summary of test pit results by field and landform element.

account of its landform status, only then being followed up with targeted fieldwalking and test pitting. This example serves to show how the landform element technique can be used to drive evaluation strategies in areas of the landscape which had hitherto been widely considered to be archaeologically sterile. In addition, this evidence for Early Neolithic activity within the wetland area of the basin provides a new avenue of enquiry for future considerations of Neolithic settlement and land use.

Akeld (Fields 22 and 25)

Field 22 is located on a gravel terrace (landform 1d) above the River Till with views to south, east and west at an elevation of 50m above OD (Fig. 3.10). It forms an area designated for sand and gravel extraction and is likely to be removed in its entirety over the next decade. A total of 166 lithics was recovered from the ploughed field surface (see Table 3.2). There is a very clear cluster of finds in this field at its northern end which includes many Neolithic/Early Bronze Age pieces as well as Mesolithic material. As the field is very large, the overall density for the field is low to medium when compared with other fields in this survey. However, if the concentration of material at the north end of the site is taken on its own, and bearing in mind also the large number of finished tools, then this cluster of material has a high density and it constitutes one of the best assemblages of Neolithic flintwork so far discovered in the county. Occasional clusters of Neolithic material were located away from this main concentration but the density of Neolithic finds falls off sharply. With only one diagnostic Neolithic piece in the southern area of the site, this reinforces the view that the Neolithic/Early Bronze Age activity appears to be focused towards the north end of field 22. It is also worth noting that diagnostic Neolithic and Early Bronze Age flints have been previously discovered in the fields immediately north of field 22 in Ewart Park (Joan Weyman archive, Museum of Antiquities,

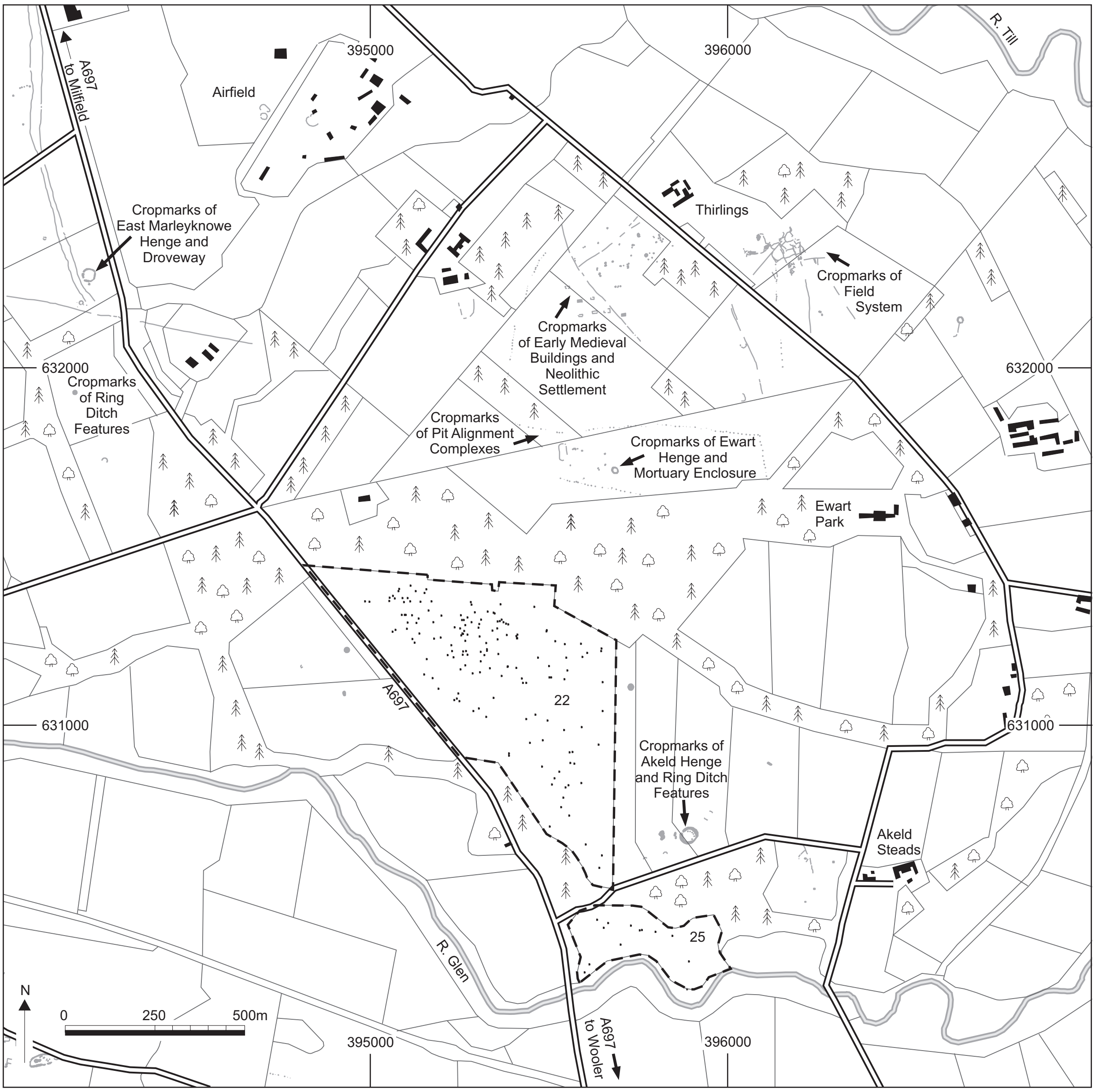


Fig. 3.10. Akeld fieldwalking findspots (fields 22 and 25).

Newcastle), where the cropmarks of a henge, a possible mortuary enclosure and pit alignments are located (Miket 1976). It is likely that the field 22 cluster is associated with settlement activity related in some way to the Ewart and Akeld ceremonial complexes.

Mesolithic material was also found dispersed across the field with some loose concentrations in both the northern and southern areas. This is typical for Mesolithic finds, which tend to have a more dispersed distribution pattern than the more tightly clustered Neolithic and Early Bronze Age scatters. It is feasible that some buried Mesolithic features may survive in the field and if any were to be anticipated then it is most likely that they would occur at the north end of the field amongst the Neolithic features, as this is where the highest density of Mesolithic material was located.

The assemblage from this field (including the finds from the test-pit, see below) is particularly notable for the quality and quantity of Neolithic tools present and the amount of chronologically diagnostic material. Of the entire assemblage, 36.4% are tools (i.e. belong to the tertiary stage in the reduction sequence), while 52.3% belong to the secondary stage and 11.2% to the primary stage. Finds of particular note include a leaf-shaped arrowhead (Fig. 3.32, 1015) and a chisel arrowhead (Fig. 3.32, 1076), both in pristine condition. There are also many other typical Neolithic pieces including end scrapers (Fig. 3.31, 1708), edge-trimmed and retouched blades (Fig. 3.30, 982), a spear point

(Fig. 3.32, 1703) and a serrated blade (Fig. 3.30, 1160). Early Bronze Age pieces include a broken barbed and tanged arrowhead, as well as scrapers (Fig. 3.31, 1012, 1055, 1094 and 1695) and flake tools. The Mesolithic material is represented by a large number of micro-cores (21), a variety of blades and blade tools, and some typical scrapers with abrupt unifacial retouch (Fig. 3.31, 1012, 1055, 1094 and 1695).

A small fragment of early prehistoric pottery, possibly a piece of Grimston Ware series pottery, shares similarities in its fabric with other Carinated Bowl material that has been found at a number of sites across the gravel terraces of the basin (see Waddington 2000b). However, as it is such a small piece this attribution is by no means definite, although on the basis of its fabric, colour and lack of decoration it can certainly be considered to be Neolithic/Early Bronze Age in date. As pottery does not survive long in the ploughsoil it is evident that this fragment was brought to the surface by a recent ploughing episode on the field. This suggests that the plough had clipped a buried archaeological feature, dislodging the pottery and bringing it to the surface as the soil was turned.

The two fragments of post-medieval pottery were both found at the very north-west end of the site. As there was such a small quantity of this ceramic from the field it is unlikely that it is representative of settlement activity, but rather could be associated with manuring or discard of waste.

A cache of 10 large blades and flakes interleafed with each other was discovered lying on the field surface in a patch of freshly ploughed-up orange gravel (Fig. 3.11) and occurring within the cluster of material at the north end of the field. The presence of these pristine pieces on the surface suggested that a sub-surface feature had been truncated by the plough and the flints from its disturbed fill redeposited on the surface. All the pieces are of nodular flint that has evidently been imported to the area, and all are typical of Neolithic or Early Bronze Age manufacturing traditions. On examination most of the blades and flakes showed evidence of retouch and utilisation, indicating their use as tools before they were discarded.

A 1×1m test pit was excavated around the flint cache and the entire contents of the pit passed through a 5mm sieve. An additional 48 large flint pieces were found in a tight cluster immediately below the cache, again all in pristine condition. They included an end scraper, a large cortical side scraper, together with a spear point and other retouched tool forms that are Neolithic/Early Bronze Age in date. Including the flints from the surface cache (making a total of 58), 42 are classifiable as Neolithic/Early Bronze Age. On cleaning the base of the pit, an interface between differing natural geology was identified with orange gravel on the south side of the test pit and buff-coloured sand on the north side (Figs 3.12 and 3.13). In the north-west corner of the test pit, part of an archaeological feature was identified that comprised a cut feature with a differently coloured and textured

Fig. 3.11. The blade cache in field 22 lying in freshly ploughed up orange gravel.

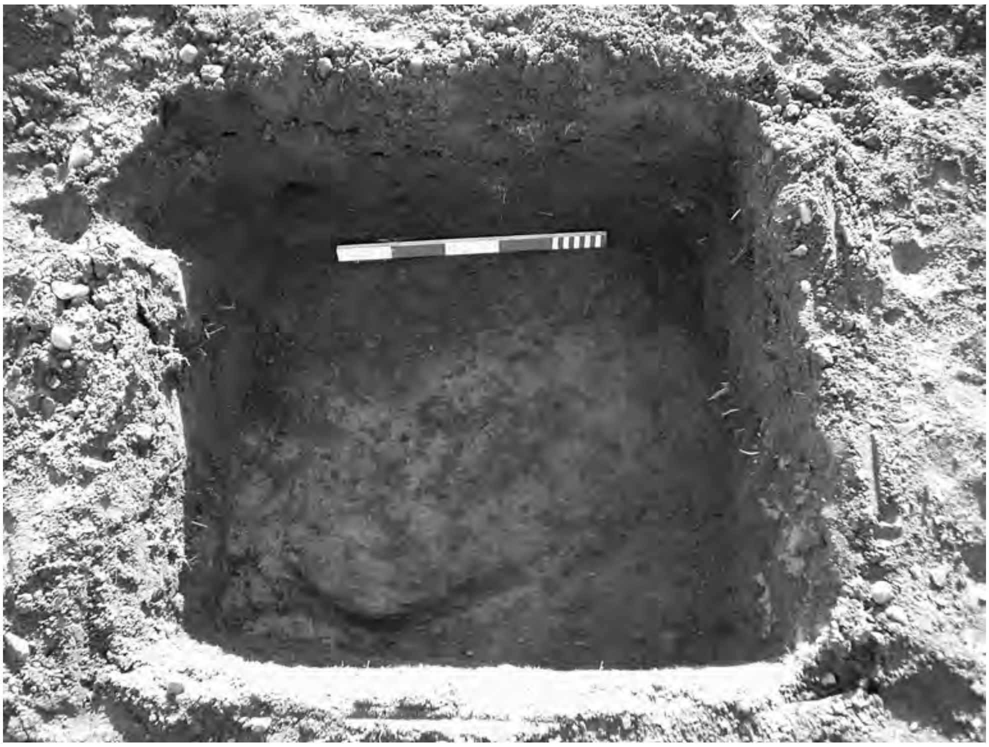


Fig. 3.12. Test pit looking south with the charcoal-flecked grey fill of the feature in the bottom right of the pit (scale = 0.5m).

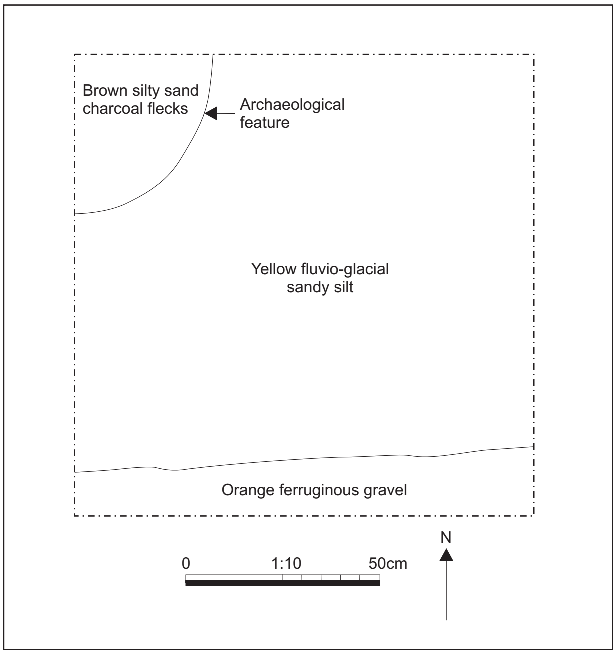


Fig. 3.13. Plan of test pit.

fill than the surrounding natural substratum. The fill of the archaeological feature comprised a brown silty sand with charcoal flecks. It is thought that the cache of flints was brought up to the surface from this truncated feature.

The presence of the archaeological feature in the base of the test pit demonstrates the presence of buried archaeology at the north end of field 22. With its associated flints it can be reasonably attributed to the Neolithic/Early Bronze Age, and as such could be contemporary with the ceremonial complexes at Akeld Steads to the east and Ewart Park to the north.

Field 25 is located on the alluvial floodplain (landform element 2b) at a lower elevation than field 22, at 38–40m OD. The area walked extended over 4.9ha and produced a total of 13 lithics that included five flakes, three cores, two retouched flakes, one blade and one utilised flake (see Fig. 3.2 above), together with a broken whetstone. The low count is, no doubt, partly a result of this low-lying ground being an area that has accumulated a depth of alluvial deposits throughout the Holocene, resulting in the masking of any earlier archaeology by a successive build-up of fine-grained sediments. Any archaeological remains that may survive in this area are likely to be buried at a depth of at least 0.5–1.0m, if not considerably more. The 13 lithic finds are considered most likely to have been brought on to the surface of this area as a result of the downslope movement of artefacts from the surrounding higher slopes. Alternatively they may have been deposited by floodwaters that have brought eroded archaeological material from upstream as there is clear evidence for Stone Age activity further upstream at sites such as Yeavering (Hope-Taylor 1977).

Yeavering (Field 31)

Field 31 is located at Yeavering at the mouth of the Glen valley on what is largely a gravel terrace (mixture of landforms 1b and 1d) that contains the cropmark site of the Yeavering henge, together with other features associated with the prehistoric and Anglo-Saxon occupation of the site (Fig. 3.14). A total of 30 lithics was recovered from the surface but only one of these was flint, the rest being agate (12), chert (11) and quartz (6). There were 10 cores, 12 flakes, 1 blade, 4 retouched and utilised flakes, 2 scrapers and 1 microlith. The lithics and are thought to be largely Mesolithic in date, which corresponds with other evidence for Mesolithic occupation obtained during the excavations in the adjacent field by Hope-Taylor (1977). He commented that "Struck flakes of flint (and occasionally of chert) occurred as stray finds in the overburden, some of them unmistakably Mesolithic; but as there is a lack both of context and specific forms it would be pointless to illustrate and discuss them" (Hope-Taylor 1977, 194–6). A discussion of Mesolithic activity at the site has been published elsewhere by the author (Waddington 2005a).

Milfield Village South (Fields 90–95)

This group of six fields was located around the south side of Milfield village, filling in an area of the transect undertaken as part of an earlier fieldwalking survey (Waddington 1999) on an area of shallow Cheviot drift, Cheviot-derived undifferentiated drift and fluvioglacial sand and gravel terraces (landform elements 1a, 1b and 1d respectively; Fig. 3.15).

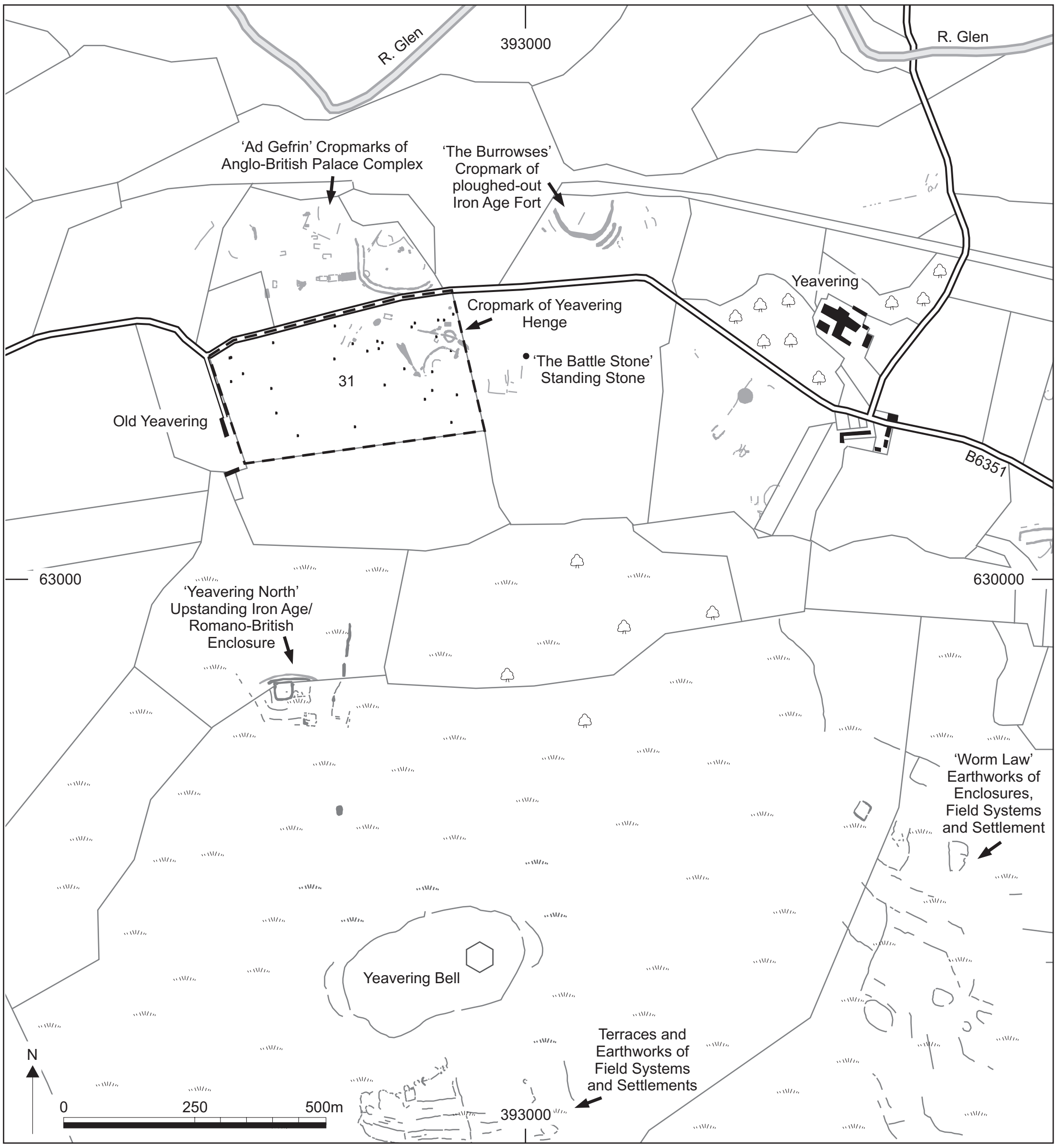


Fig. 3.14. Yeavering fieldwalking findspots (field 31).

All these fields produced consistently high lithic densities, ranging between 13.3 and 28.8 lithics per hectare, all of which are well above the average for this area. This emphasises the importance of the low Cheviot slopes and sand and gravel terraces for hosting prehistoric archaeology of all periods and this gains further support from the wealth of cropmarks known in these and surrounding fields. The fieldwalking finds include Mesolithic, Neolithic and probable Early Bronze Age material, whilst the cropmark evidence from these fields and adjacent areas has revealed Neolithic, Bronze Age, Iron Age and early medieval remains. This has been demonstrated beyond doubt by excavation and dating of several of these sites (e.g. Chapter 5 this volume; Harding 1981; Waddington 2006). More particularly, the diagnostic Mesolithic material was clustered around the area of the late glacial/Early Holocene wetland channel that tracks across these fields, whilst the later material was clustered on the sand and gravel terrace closer to the monument complex.

Kimmerston (Fields 23 and 24)

Two large fields were surveyed at Kimmerston: one on the fluvioglacial gravel terrace (landform element 1d) between Kimmerston Bog and the River Till at 40m OD, and the other on an area of plateau and hillslope on shallow drift cover and undifferentiated drift (landform elements 1a and 1b) at 70m OD (Fig. 3.16). Both fields produced relatively low lithic densities, field 23 having an adjusted lithic count per hectare of 6.4 and field 24 a count of 4.6. The diagnostic

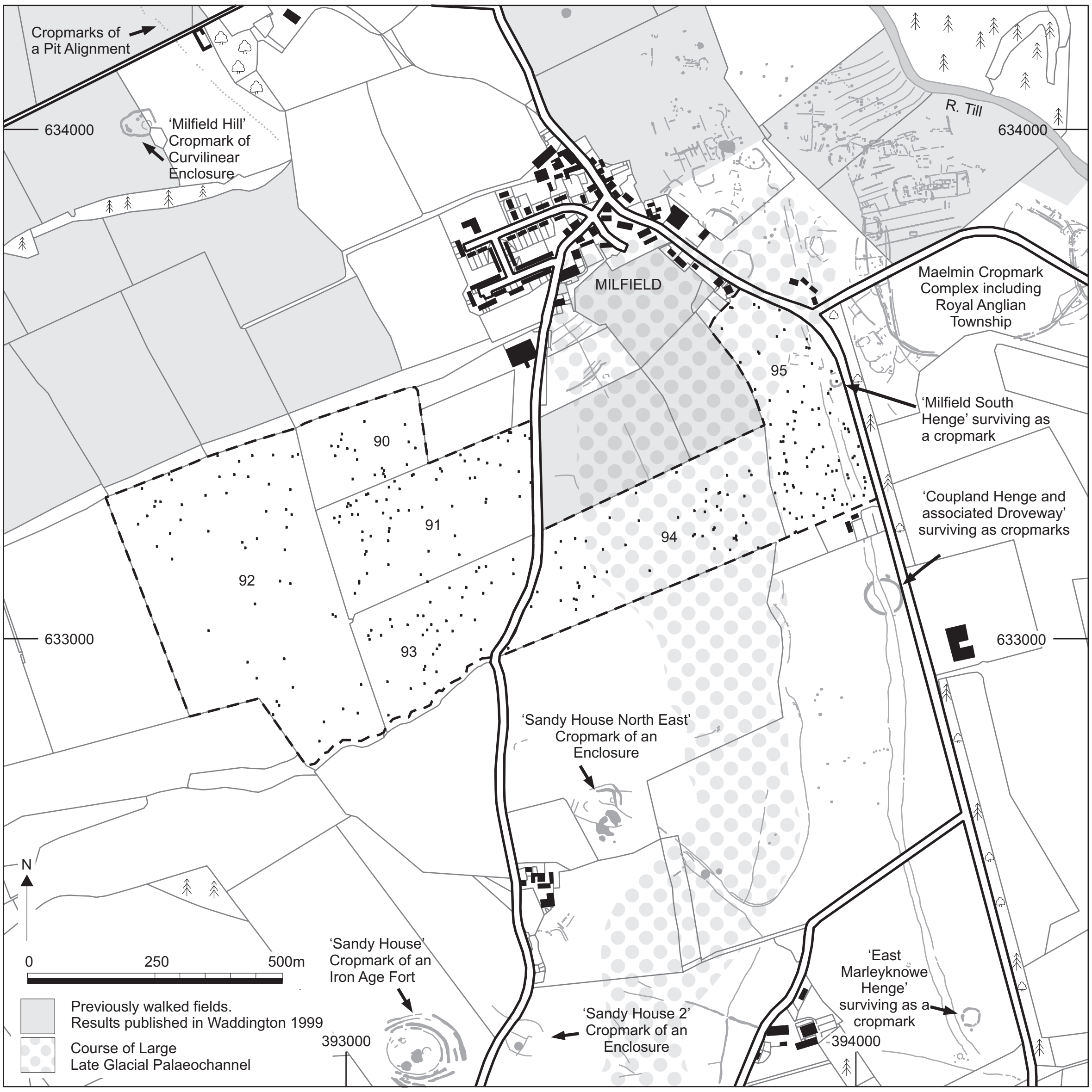


Fig. 3.15. Milfield Village South fieldwalking findspots (fields 90, 91, 92, 93, 94, 95).

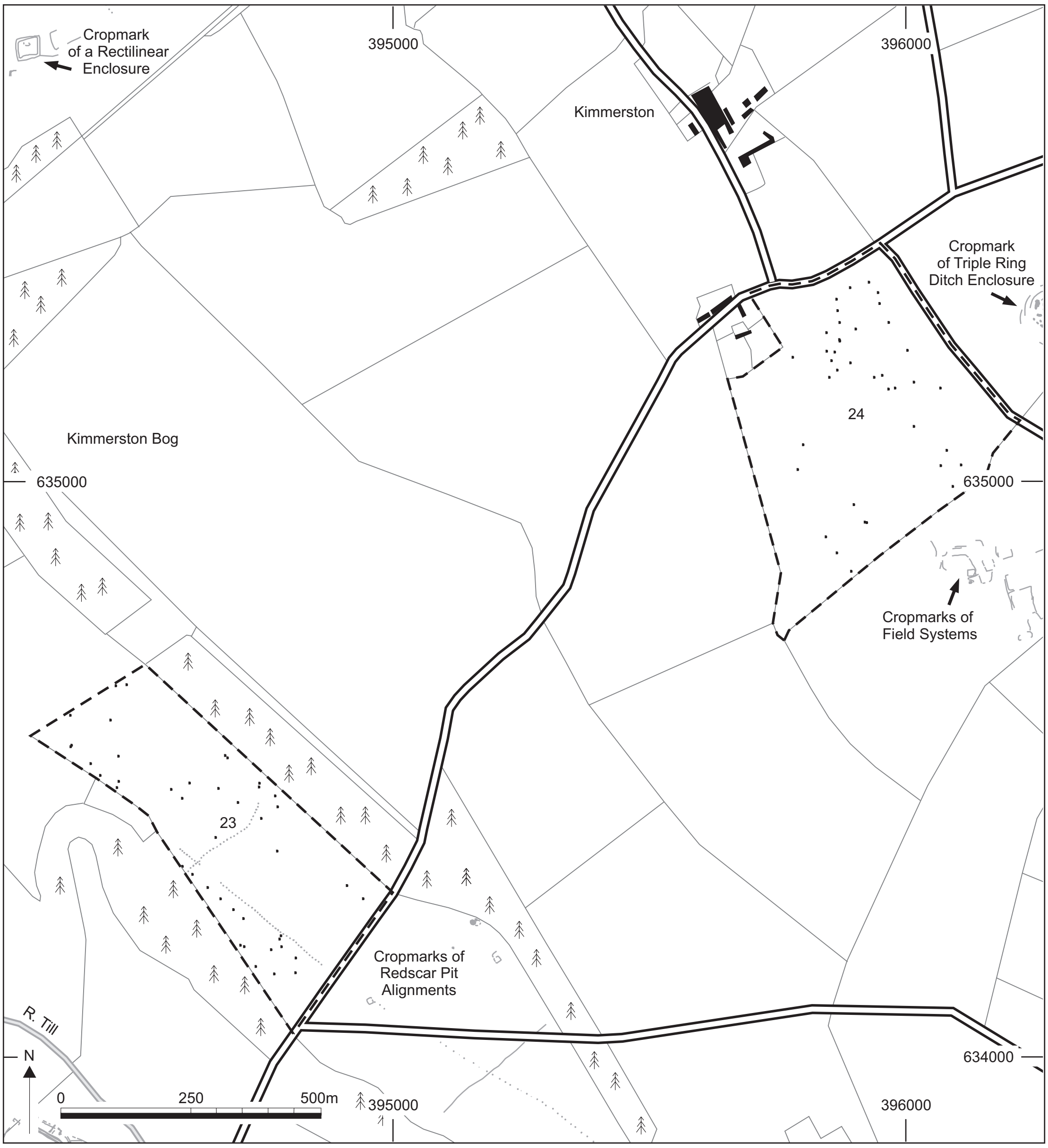


Fig. 3.16. Kimmerston fieldwalking findspots (fields 23 and 24).

material from both fields included Mesolithic material comprising cores, retouched flakes and blades and a scraper. However, there was also some Neolithic/Early Bronze Age material in field 23 that included a broken tool with invasive retouch, probably tanged, as well as a plano-convex knife (Fig. 3.32, 1241). Neolithic and Early Bronze Age pottery has been recovered from the area around field 23 (Miket 1976; 1987) and, together with the lithics recorded by the fieldwalking, suggests this area formed an important focus for Neolithic and Early Bronze Age activity. This may be related to the fact that this area of terrace occupies a pinch point in the valley and forms the natural east-west crossing point within the Milfield Basin. The aerial photographs show a large pit alignment complex running through this field and excavations here have returned a series of Romano-British dates from their fills (see Chapter 5). Occupying a strategic crossing point across what was otherwise a wet, and often flooded, valley floor, this gravel terrace contains evidence for multi-period activity stretching from the Mesolithic to the Roman Iron Age.

Roughting Lynn (Fields 109–118)

This group of 10 fields encompassed an area to the immediate south of Goatscrag and Roughting Lynn in the lee of the Fell Sandstone escarpment, lying on Fell Sandstone-derived drift (landform element 1b), and two fields further downslope on undifferentiated drift that merges into a sand and gravel terrace (landform elements 1b and 1d respectively; Fig. 3.17). These fields contain quite a variation in their surface

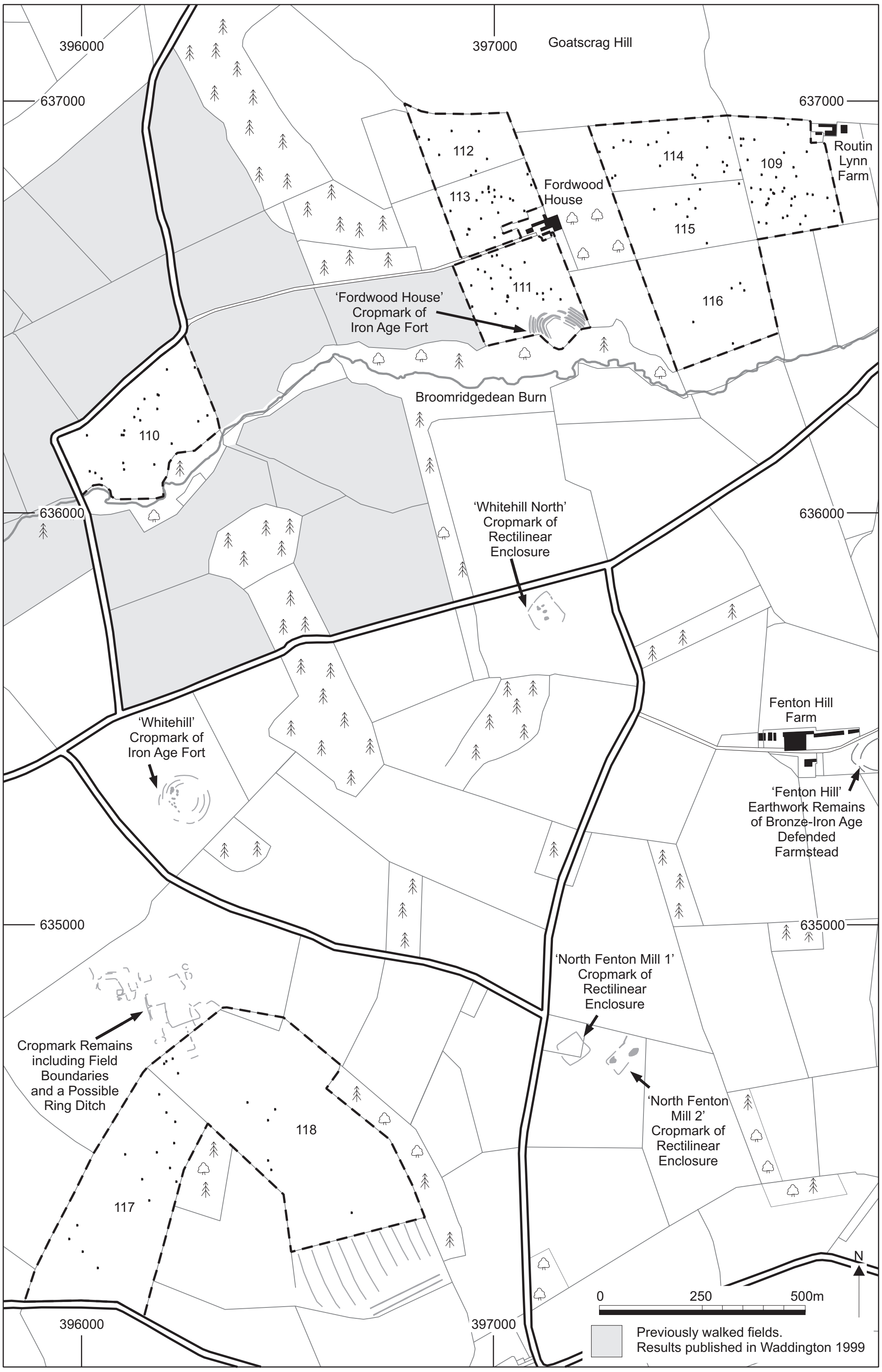


Fig. 3.17. Roughting Lynn fieldwalking findspots (fields 109, 110, 111, 112, 113, 114, 115, 116, 117, 118).

lithic densities, although much of this can probably be accounted for by relating the artefact spreads to the taphonomy of each field. The level areas appear to have been the more favoured areas whilst the more steeply sloping areas falling down to the burn were less so. It is clear that artefact movement occurs regularly on these slopes as witnessed by the colluvial spreads, sometimes containing chipped lithics, that could be observed during the walking of these fields. Most of the lithic material from these fields was of Mesolithic character and much is evidently derived from the outcropping rock faces above that not only dominate the skyline here, but provide a strategic location from which to observe the movement of people and animals into and out of the Milfield Basin. The evidence for the use of the Goatscrag outcrop (Fell Sandstone) as a rock shelter site has been documented and discussed elsewhere (Burgess 1972; Waddington 1999) but the areas below this seem also to have been a favoured location for hunter-gatherer groups, particularly as there is access to freshwater close by. The lithic assemblage is dominated by flakes of various kinds together with cores and some edge-trimmed and retouched pieces indicating that lithic-working and maintenance was carried out around this locale.

In addition to the fieldwalking evidence for early prehistoric activity, the cropmark evidence and upstanding earthworks hereabouts reveal a predilection for the sandstone slopes in later prehistoric times. These easily tilled soils were occupied by nucleated and enclosed farming settlements occupying defensible locations, such as the Fordwood House enclosure, located so as to back on to a very steep bluff, the hilltop enclosure on Whitehill, and the multi-phase defended site at Fenton Hill (see also Burgess 1984). Excavations at Goatscrag (Burgess 1972) and at other crags on the Fell Sandstone (Beckensall 1976) have also shown that these areas were by no means neglected during the Early Bronze Age, when the foot of the crags was frequently used for burial in the form of inverted urn cremations placed into pits dug into the ground.

Wark-on-Tweed (Fields 26, 27, 28, 29, 34, 35, 36)

Wark-on-Tweed is well known for its medieval castle situated on the end of a glacial esker and overlooking the River Tweed (Fig. 3.18). A cluster of seven fields was walked in this area, producing widely varying lithic densities. Fields were sampled on the alluvial valley floor, the low gravel terraces and on a higher raised gravel terrace. The alluvial fields 27 and 28 produced relatively low counts of 3.6 and 6.4 lithics per hectare but the other alluvial field 26 produced a very high count of 20.6. The diagnostic material from these fields was all Mesolithic in date. The two fields on the low gravel terrace, 29 and 34, produced very high counts of 27.5 and 28.6 lithics per hectare respectively. The diagnostic material from these fields included both Mesolithic and Neolithic material. The cropmark data for field 29 show an interesting group of features that includes an oval enclosure which could be a Neolithic mortuary enclosure, providing a context for Neolithic activity in this area of the river valley (see Figs 4.5–4.6). The fields surveyed on the higher gravel terrace, 35 and 36, produced medium to low counts of 8.6 and 3.9 per hectare respectively, indicating a lower level of activity than on the terraces closer to the river. The only diagnostic material from this upper terrace was Mesolithic in date.

St Cuthbert's Farm (Fields 30, 32, 33)

Named after the ruinous chapel dedicated to St. Cuthbert, this area lies at the confluence of the rivers Till and Tweed (Fig. 3.19). The sampled area occupies a drumlin that has been truncated along its north-west edge by the River Tweed. The terrain here is dominated by sub-glacial ice-moulded drumlins that tend to track in a north-east to south-west direction (landform element 1b) with localised spreads of deglaciation sands and gravels (landform element 1d). Field 30 was set back further from the river and this produced a modest count of 5.8 lithics per hectare, although it potentially has finds belonging to the Mesolithic, Neolithic and Bronze Age, the most notable being what appears to be a perforated macehead made from quartz but broken by the plough (Fig. 3.36, 1680). Fields 32 and 33 stand out starkly from all the other fields surveyed as they produced huge lithic densities. Field 32 produced an adjusted density of 35.3 lithics per hectare while field 33 produced a massive 198.9 lithics per hectare – the highest density so far recorded in North-East England. All the diagnostic material in these adjoining fields was Mesolithic and the huge cluster of material in field 33 is thought to represent a Mesolithic settlement site. This relatively tight scatter of material merits further investigation as it could conceivably overlie buried remains similar to those recently discovered at Howick on the Northumberland coast (Waddington 2007a). The Mesolithic material includes cores, retouched flakes and blades, utilised blades and a possible microlith (Fig. 3.36, 2141) and burin (Fig. 3.34, 2250). The lithic assemblage contains a diverse mix of material that includes flint, agate, chert and quartz pieces. With ample cropmark evidence for later prehistoric and Romano-British period settlements across these fields and adjacent areas, these fertile ice-moulded drumlins have the potential to host a high density of prehistoric archaeological remains.

It was decided to investigate the scatter of material in field 33, as the implied presence of a Mesolithic settlement held the prospect of sub-surface structural remains surviving. A total of 20 1×1m square test pits was excavated by hand (Fig. 3.20) and their contents passed through sieves with a 10mm mesh to maximize finds recovery. The test pits were set out in two offset

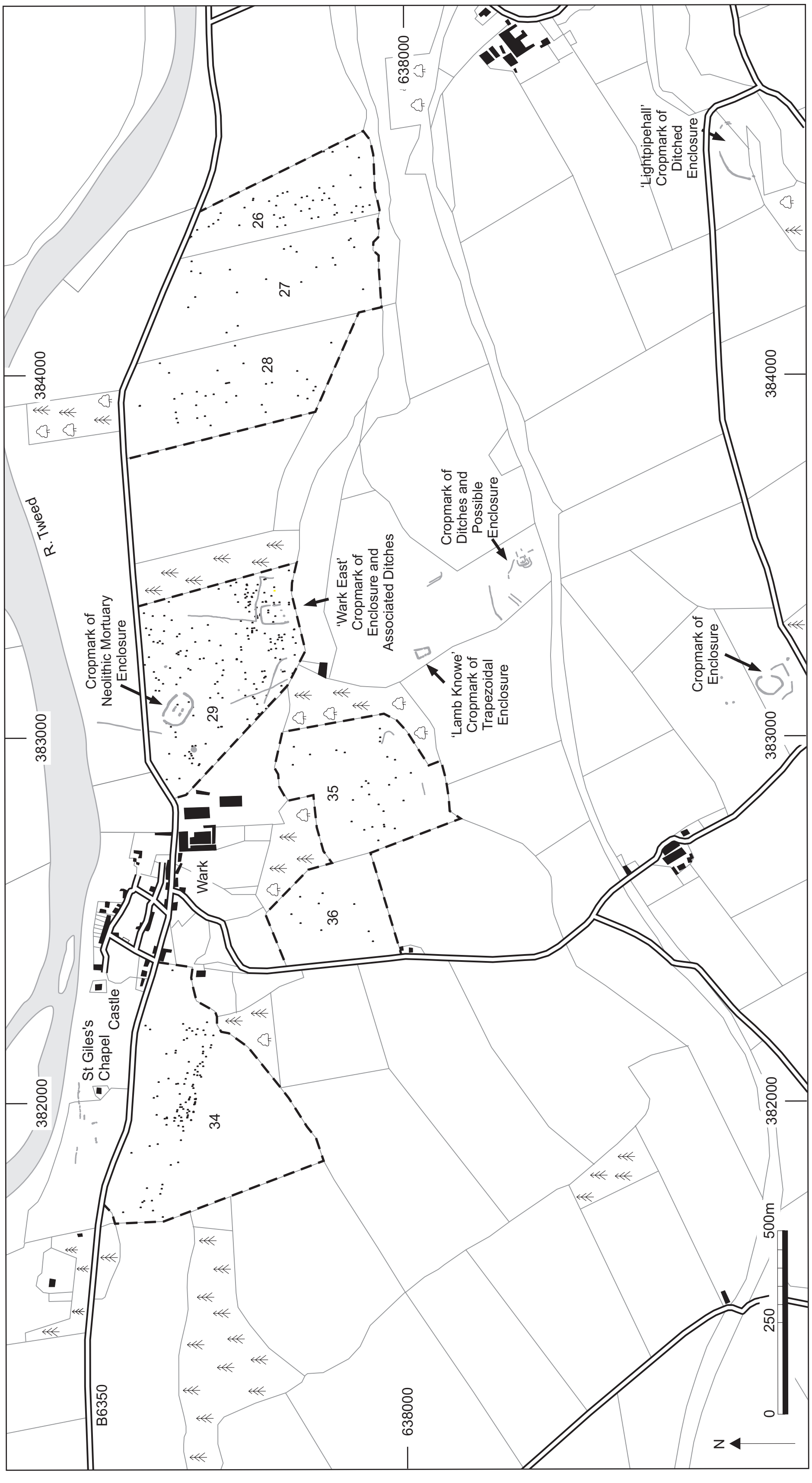


Fig. 3.18. Wark-on-Tweed fieldwalking findspots (fields 26, 27, 28, 29, 34, 35 and 36).

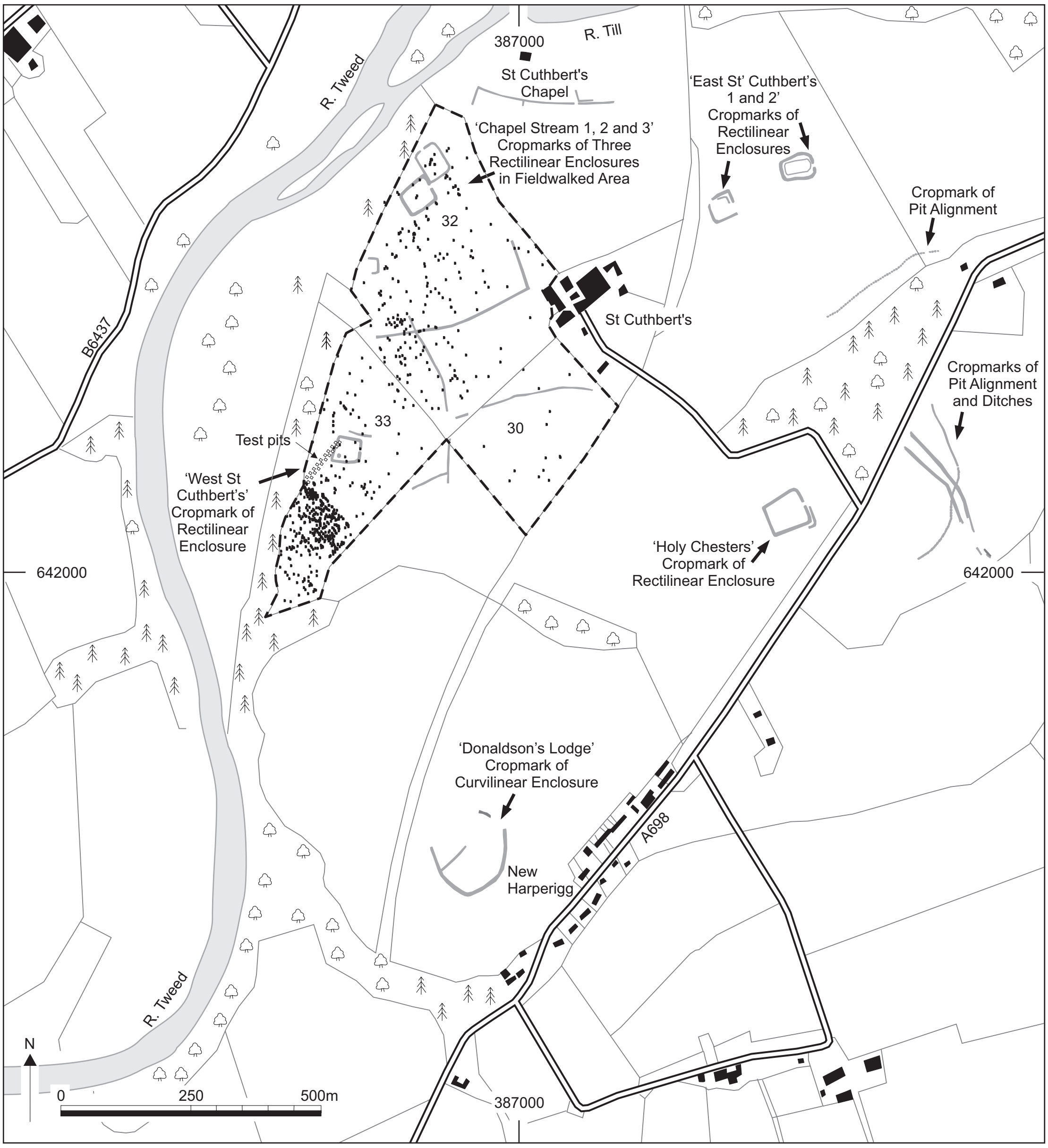


Fig. 3.19. St Cuthbert's fieldwalking findspots (fields 30, 32 and 33).

lines of 10, with pits 5m apart. The aim of this sampling strategy was to identify whether any sub-surface remains survived that could be associated with the Mesolithic activity represented by the lithics. As all but one of the Mesolithic hut sites so far discovered in Britain have diameters of *c*.6m (Waddington 2007a, 204), the offsets and 5m spacings would ensure that any hut structure below the area sampled would be identified. In the event no hut deposits were observed but a linear slot (thought to be the remains of a degraded timber) was recorded in pit 2 (Fig. 3.21) and radiocarbon dated to *c*.160 cal BC–cal AD 70 (2020±35; SUERC-9079) and cal AD 40–130 (1960±35; SUERC-9078), indicating a Late pre-Roman Iron Age or very early Roman Iron Age feature. Elsewhere on this area of the drumlin, the ditch fill of a rectilinear cropmark enclosure was recorded in pits 10 and 18. Although no definite evidence for a hut feature was noted in this small sampling exercise it did produce evidence for buried features on this bluff. An additional 128 lithics were recovered from the test pits including a crescent microlith from pit 1, lying only 5m away from the slot feature in pit 2 (Fig. 3.37, 4). This microlith is directly analogous to the crescent forms found at Howick dating to *c*.7850 cal BC (Waddington 2007a, 84). The other lithics included 11 cores of mostly platform and blade varieties, three scrapers, one burin, one knife, four retouched blades, two utilised blades, one retouched flake, 19 blades and 85 flakes. This is a high number of lithics to be retrieved from just 20 test pits, supporting the view that there was intensive Mesolithic activity in this locale and adding to the possibility that buried Mesolithic features could survive on this site.

In addition to the lithic evidence for intensive ear-

Fig. 3.20. Test pits in field 33 looking south-west.

Fig. 3.21. Test pit 2 in field 33 showing excavated linear slot thought to be the remains of a fallen timber.

lier prehistoric activity in this area, this drumlin also attracted a number of enclosed Iron Age and Romano-British period farmsteads, field boundaries and a pit alignment, as witnessed by the evidence from aerial photographs (Fig. 3.19). Indeed the rectilinear enclosure at Holy Chesters near St Cuthbert's Farm sits on the crest of another drumlin parallel with the one on which St Cuthbert's Farm now sits.

West Newbiggin Farm (Fields 37, 38 39, 40 and 45)

An important cluster of buried sites is located at Groat Haugh on West Newbiggin Farm on the south bank of the Tweed. It includes an unusual circular enclosure with an inturned entrance, as well as a small Roman temporary camp, a multivallate promontory fort and an oval palisaded enclosure that sits on the summit of Whidden Hill (Fig. 3.22; see also Chapter 4). A clus-

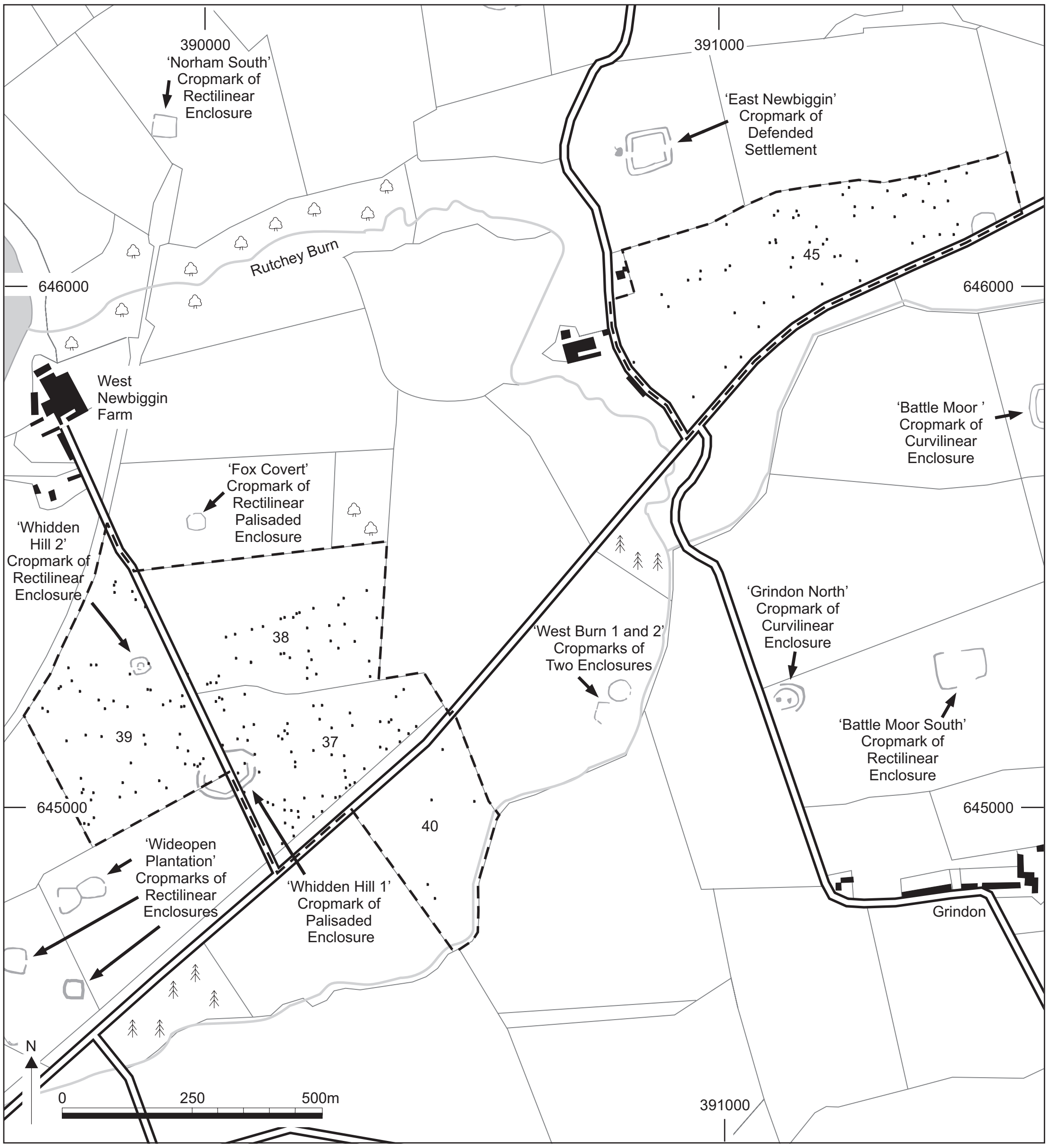


Fig. 3.22. West Newbiggin fieldwalking findspots (fields 37, 38, 39, 40 and 45).

ter of four fields was walked around Whidden Hill, another drumlinised sub-glacial landscape (primarily landform element 1b), together with a fifth outlying field at East Newbiggin that is situated next to a Late Iron Age/Romano-British rectilinear enclosure (Fig. 3.22). Together the fields extend over an area of 55.1 ha and are located around a prominent localised hilltop formed by a drumlin. The highest concentration of material came from field 37 that constitutes the largest part of the hilltop area. These fields produced a total of 168 lithics that included struck pebbles, cores, flakes, blades and a range of tools such as scrapers (Fig. 3.34, 3014) (including an end scraper (Fig. 3.35, 3044)), retouched blades (Fig. 3.33, 3073) and flakes, a microlith, two points (Fig. 3.35, 3100 and 3121) and an awl (Fig. 3.35, 3081). These finds were interesting as they include some pieces which could potentially be of Late Upper Palaeolithic or Early Mesolithic age, as well as the more typical later Mesolithic narrow-blade forms and some probable Early Neolithic pieces. Together with the palisaded enclosure these finds indicate the long term attraction of this localised area of high ground throughout much of prehistory. The outlying field, 45, which includes part of an esker landform, produced a high concentration of material that included chronologically diagnostic artefacts such as a Neolithic leaf-shaped arrowhead, and Mesolithic cores, scrapers and edge-trimmed flakes. Again, it is the dry, locally high ground that appears to have formed an attractive locale for Stone Age activity. The slope mapping for these fields indicates that most of the material recovered on the

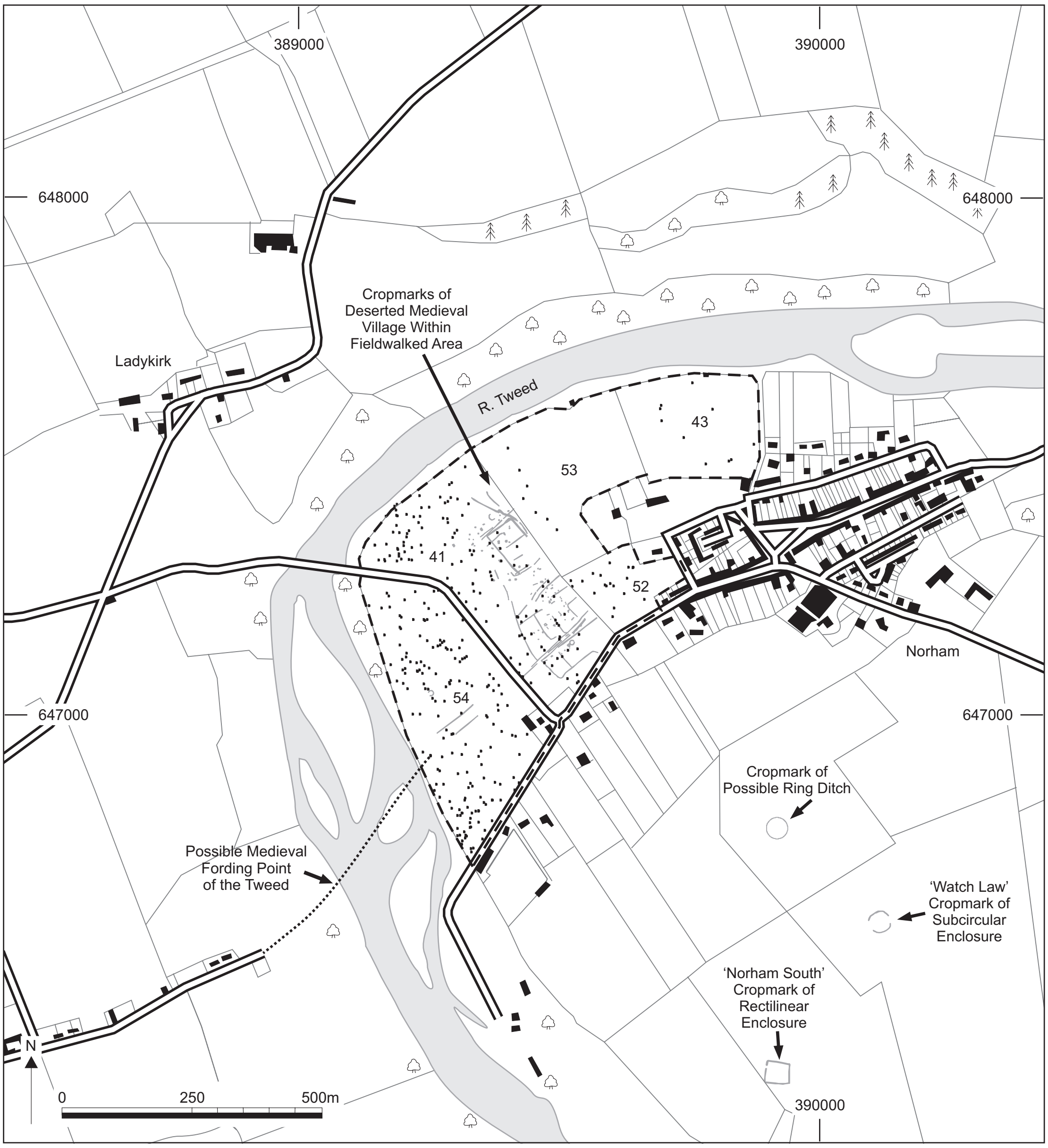


Fig. 3.23. Norham fieldwalking findspots (fields 41, 43, 52, 53 and 54).

slopes must have come from a source area on the top of these glacial landforms. In this case it is clear that not only hunter-gatherer groups, but also Neolithic, Bronze Age and Iron Age communities targeted the crests of these drumlins for settlement presumably on account of them providing dry ground and affording wide views.

Norham (Fields 41, 43, 52, 53 and 54)

The fields surveyed in the Norham area were clustered at the west end of the village opposite the river cliffs below Ladykirk, and adjacent to the present and earlier bridging points (Fig. 3.23). The landforms here comprise the junction of sub-glacial undifferentiated drift (landform element 1b) meshing with fluvio-glacial gravel terraces (landform element 1d), grading down to Holocene alluvium (landform element 2b). The cropmark evidence indicates the presence of a deserted medieval village in fields 41, 52 and 53 and the presence of a roadway leading to the old fording/bridging area at Canny Island opposite the road leading into Upsettlington. The fields occupy a gravel terrace set back between 5m and 10m above the river level, although the lowest terrace closest to the river bank has a veneer of fine alluvial sediments overlying the gravel. A total of 32.3 ha was surveyed in this locale. The lithics cluster on the upper terraces that run through the fields on the areas of flat and gently sloping ground. Being located within the bend of the river this is a naturally protected and strategic location, particularly as it forms a convenient bridging point by way of the river islands adjacent to field 54. The lithic density in fields 41 and 54 is high, being 11.8 per hectare and 40.0 per hectare respectively. Moreover, the assemblages demonstrate clear evidence for Mesolithic activity that includes an abundance of cores (see Fig. 3.33, 3630, 3663 and 3667), blades (see Fig. 3.34, 3642) and flakes, retouched and utilised blades and flakes, as well as scrapers (see Fig. 3.35, 3553, 3660 and 3791) and microliths (see Fig. 3.36, 3635). This volume of diverse Mesolithic tools, indicative of flint knapping, processing activities and perhaps hunting, implies this area may have formed a settlement focus in the same way as the locale in field 33 at St Cuthbert's Farm. Some possible Late Upper Palaeolithic and/or Early Mesolithic tools (based on their size and shape) were also recovered from this area, notably in field 54, which included a flint knife and what appears to be an awl made from agate, though we still know too little about early lithic traditions in the north to be able to attribute them with certainty. A Neolithic end scraper was also found. In addition to the lithics a considerable number of pottery fragments were recovered from all of these fields, dating to the medieval, post-medieval and modern periods. These were spread widely across all of the fields and may result from the spread of domestic debris from the deserted medieval village and later manuring or settlement activity. A small terrace of houses used to stand on the east side of field 41 but these were knocked down several decades ago. These fields are considered to have high potential for containing buried archaeological remains of many periods.

Norham West Mains (Fields 44, 46, 47, 48, 49, 50 and 51)

A total of 7 fields was walked around the Norham West Mains area, which extends over a large tract of land at the west end of a large meander belt of the Tweed (Fig. 3.24). The high ground set back from the floodplain comprises undifferentiated sub-glacial drift (landform element 1b) whilst the low ground by the river (fields 49 and 50) is situated on Holocene alluvium (landform element 2b). A remarkable cropmark complex survives here that includes six late prehistoric/Roman Iron Age enclosed farmsteads and what appears to be a small promontory fort on Green Hill. A total of 82.7 ha was sampled, resulting in the recovery of 108 lithics. This is a relatively low density of material but the figure is depressed somewhat by two fields (46 and 49) that produced no finds and one field (50) that produced a meagre three lithics and one piece of pottery. Fields 49 and 50 are situated on a narrow floodplain of the Tweed and have been subject to alluvial deposition. This process may have resulted in the masking of buried artefacts or rendered the land unattractive for human settlement and other activities. Fields 44, 47 and 48 all produced medium to high lithic concentrations, averaging 6.3, 8.8 and 6.3 per hectare respectively. Mesolithic cores, scrapers and edge-trimmed flakes were found in field 44, together with a Neolithic/Early Bronze Age retouched blade and a possible Palaeolithic flake. Field 47 produced Mesolithic cores (Fig. 3.33, 3460), edge-trimmed and retouched blades (Fig. 3.33, 3426), a microlith (Fig. 3.36, 3446) and scraper (Fig. 3.34, 3452), and field 48 produced Mesolithic cores, a scraper and retouched flakes. Medieval pottery sherds were also recovered from fields 47 and 48, which lie just 400m east of Norham Castle.

Norham East Mains (Fields 55, 56, 57, 58 and 59)

The land at Norham East Mains continues on from Norham West Mains and occupies the east end of a large meander belt of the Tweed (Fig. 3.25). The high ground set back from the floodplain comprises undifferentiated sub-glacial drift (landform element 1b), whilst the low ground by the river in part of field 58 is situated on Holocene alluvium (landform element 2b). The cropmark complex of late prehistoric settlements continues, with at least two enclosed sites and field boundaries visible. A total of 35.3 ha was sampled resulting in the recovery of 75 lithics. The east end of a flat-topped spur that overlooks the steep valley of the Horncliffemill Burn has the greatest concentration of lithic material at 9.3 per hectare, while all the adjacent fields have low densities. The flat-topped area of plateau appears to have been the focus for activity, with findspots on the slopes below indicating where material has been eroded and transported downhill. The only other field in this locale to produce a high density of material was field 58 which occupies a position that slopes down to a narrow floodplain from the steep bluffs above.

A promontory fort is located on the bluff at Green Hill and an old stream course used to cross this field but has now been diverted underground. These slopes appear to have been the focus for activity and the discovery of a recently broken, but otherwise pristine and very finely made, barbed and tanged arrowhead (Fig. 3.36, 3796) from near the old stream course hints perhaps at the past existence of Early Bronze Age burials on the banks of the River Tweed. This notion of Bronze Age burials at conspicuous points with views over the river is supported by the positioning of the large barrow further upstream on Riffington Hill at Tweedmouth Farm. Other finds from field 59 include Mesolithic cores, scrapers and a retouched blade. Finds from field 55 include Mesolithic cores, blades, and a scalene triangle microlith.

Horncliffe (Field 60)

A single field surveyed in the Horncliffe area, extending over 12.9 ha, forms the end of a drumlin (largely landform element 1b) to the east of Horncliffe village (Fig. 3.26). The field produced a low density of just 3.8 lithics per hectare with most of the finds clustered on an area of slope above the course of a stream. The

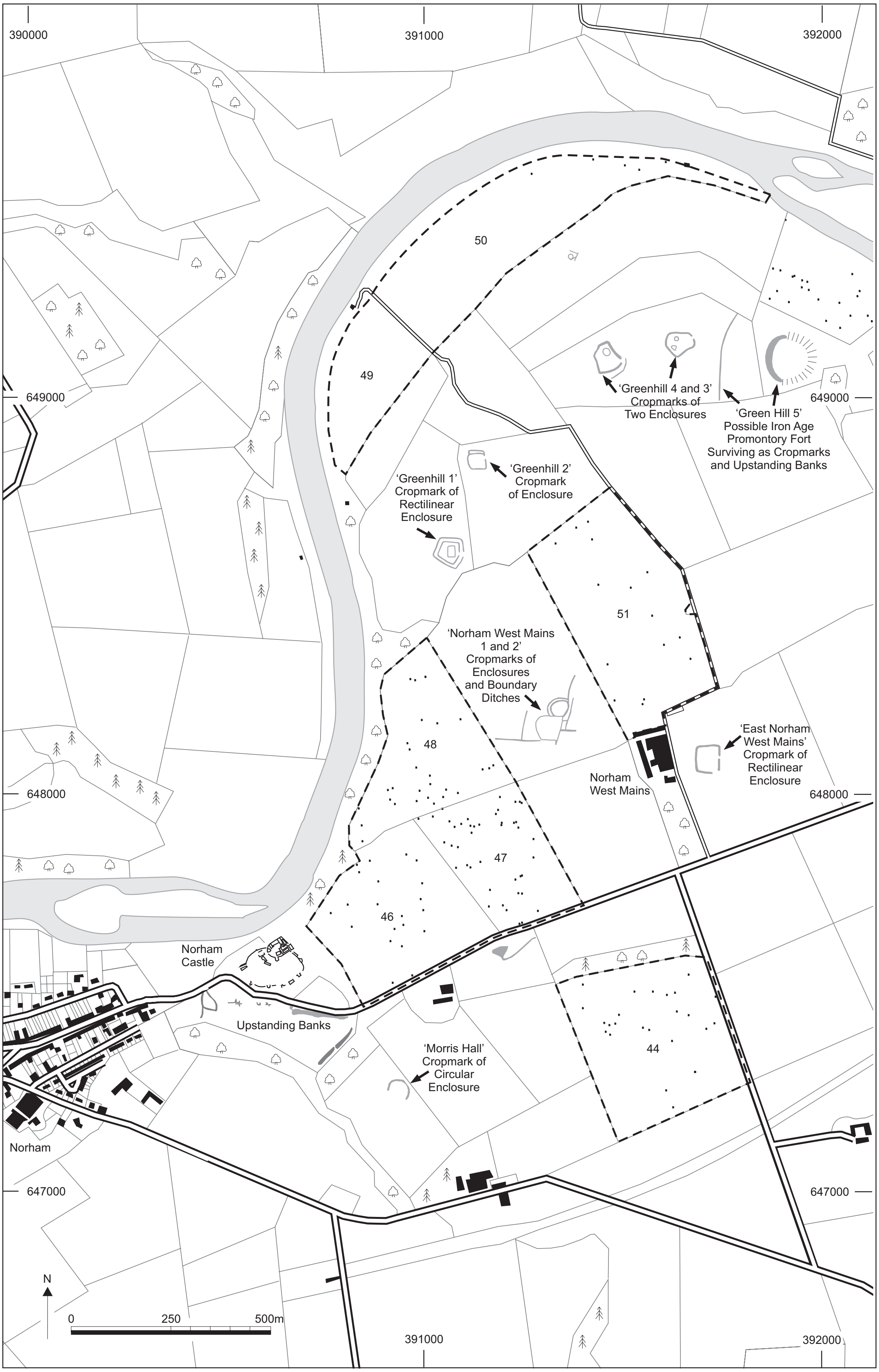


Fig. 3.24. Norham West Mains fieldwalking findspots (fields 44, 46, 47, 48, 49, 50 and 51).

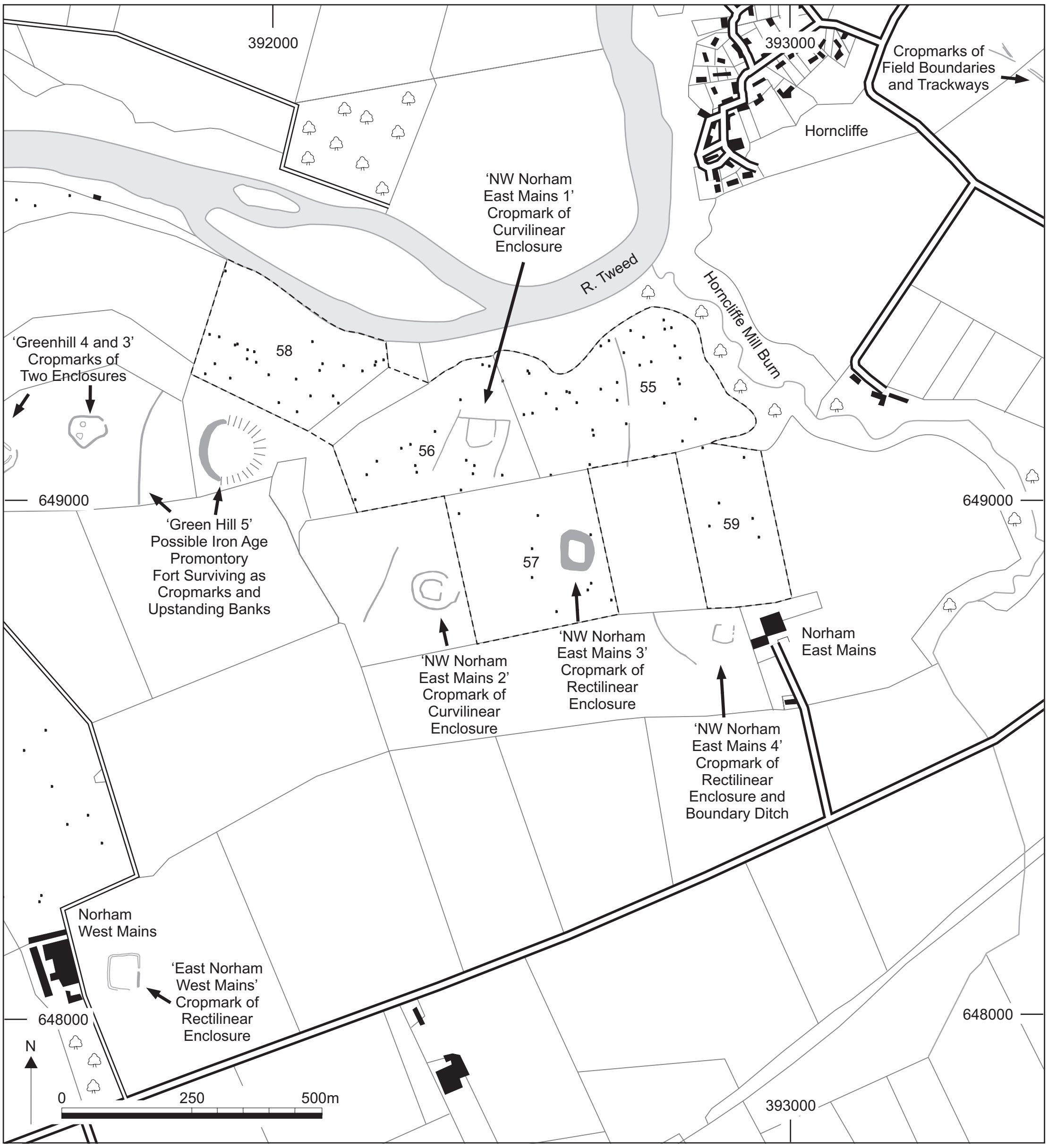


Fig. 3.25. Norham East Mains fieldwalking findspots (fields 55, 56, 57, 58 and 59).

lithics from the field included Mesolithic cores (Fig. 3.33, 3819), scrapers (Figs 3.34, 3827) and blades as well as an Early Bronze Age thumbnail scraper (Fig. 3.35, 3813).

Raw Materials

The fieldwalking lithics comprise a mixed assemblage of 3340 chipped stone pieces made from 42% flint, 28% agate, 26% chert, 4% quartz and less than 1% other materials (see Fig. 3.27 below). This reveals a diverse range of materials although most of it is from locally available sources. The glacial gravels and tills contain agate, chert and quartz nodules together with the occasional piece of flint. However, it is notable that of all the flint that could be provenanced (278 pieces), 61% was beach flint which indicates the importance of the coast for obtaining supplies. The other sources of flint included 26% glacial material and 13% nodular flint, the latter evidently being imported to the region. Invariably, the imported flint is used for Neolithic or Early Bronze Age artefacts. Furthermore, there are virtually no known chipped stone pieces of Neolithic or Bronze Age date made from non-flint material. This indicates a distinct shift in the sourcing of lithic raw material from the beginning of the Neolithic in this region, and this is supported by the recovery of nodular flint artefacts from the earliest dated Neolithic deposits in the region (see also Chapter 5). It would appear, therefore, that there was a significant shift from the use of a wide range of locally available material throughout the Mesolithic to the use of a very

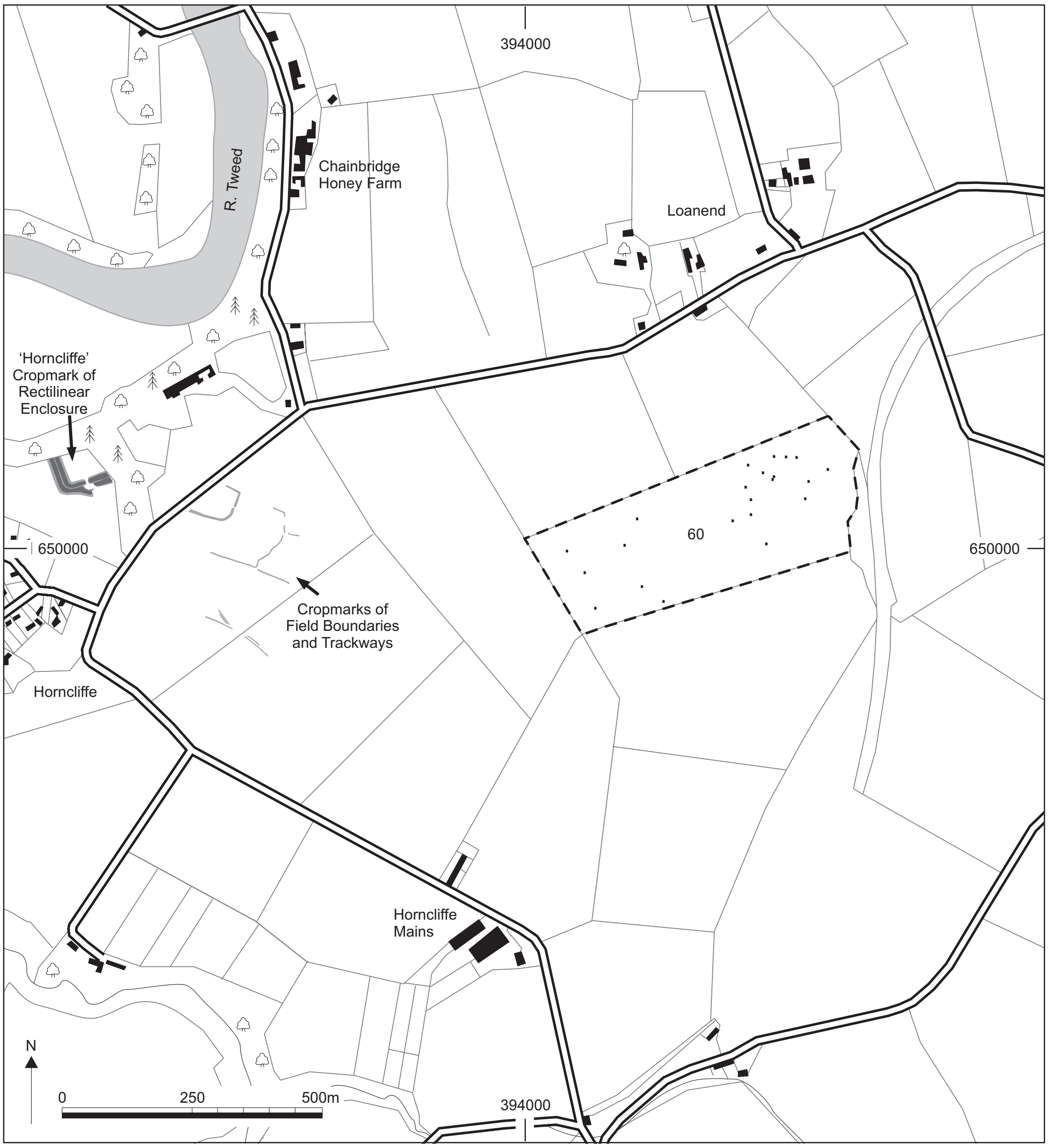


Fig. 3.26. Horncliffe fieldwalking findspots (field 60).

restricted raw material type in the Neolithic, and one that had to be imported to the area.

It is telling that all of the nodular pieces of flint that had dating associations (11 out of 12) belonged to either the Neolithic or Bronze Age, with none being of Mesolithic date, indicating that the use of nodular flint is a phenomenon associated with the Neolithic and Bronze Age. This gains further support when the 48 flints from the test pit in field 22 are included, as nearly all of these are from a nodular source and all belong to a Neolithic/Early Bronze Age context. In contrast all the Mesolithic pieces from the field that could be provenanced with confidence were of either beach or glacial flint with only one made from nodular flint. This indicates that Mesolithic raw material acquisition revolved around the procurement of locally available stone and not on the importation of flint from distant sources.

Using the datable lithics only, the proportion of lithics made from flint can be plotted for each period (Fig. 3.28). Flint forms only one of a range of materials used for making tools during the Mesolithic, comprising just 37.2% of the Mesolithic assemblage. The result for the Mesolithic, however, contrasts sharply with the Neolithic and Bronze Age where flint appears to be the only type of stone selected for making tools as it comprises 100% of both assemblages. It is also pertinent to note that there are no dated Neolithic or Bronze Age sites in Northumberland from which associated agate or chert artefacts have been recovered, suggesting that the chipping of chert, agate and quartz is primarily a Mesolithic, and perhaps also Palaeolithic,

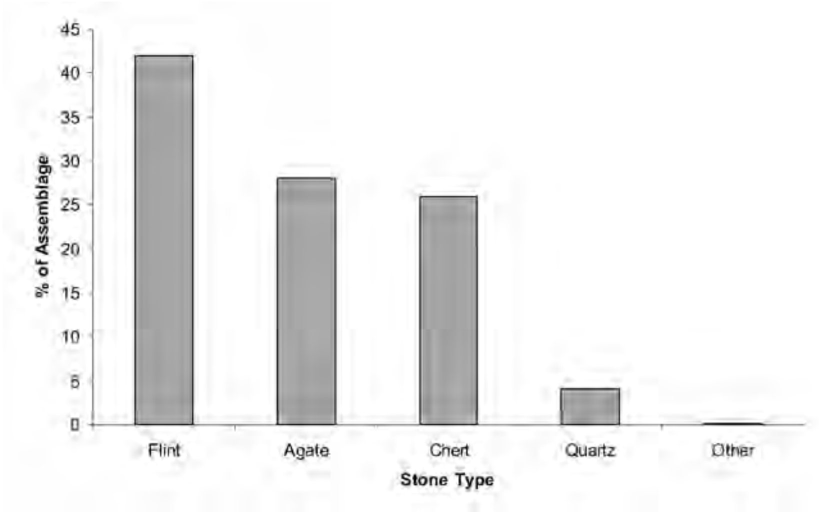


Fig. 3.27. Lithic assemblage by raw material type.

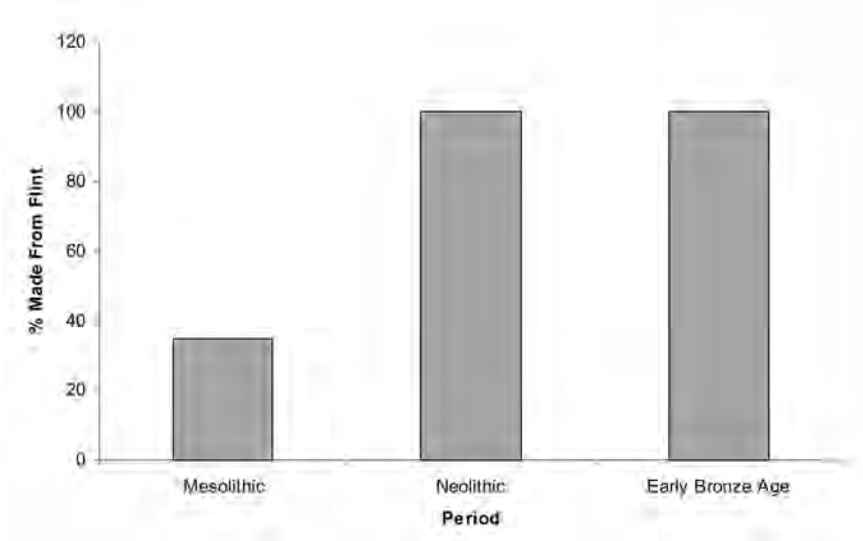


Fig. 3.28. Flint use by period.

phenomenon. This finding is of critical importance as it indicates that a significant and perhaps rapid shift took place in the procurement of raw materials during the transition from the Mesolithic to Neolithic periods. At one level it indicates a switch from locally based procurement strategies in the Mesolithic to strategies that relied on importation of material, presumably via a system of exchange networks. This indicates an important difference in lifestyles as the Mesolithic inhabitants appear to have opted to employ a self-sufficient existence as opposed to Neolithic and Bronze Age groups who relied on wide-ranging exchange in order to obtain such essential heavy and bulky materials as nodular flint. This use of nodular flint from the Neolithic onwards corresponds with the occurrence of the first flint mines in southern and eastern England from where some of the nodular flint no doubt came. Such mines provide the context for the mass procurement of this material that would have been necessary if it was being exported across the country to areas as far away as Northumberland. Indeed the flint mines of Sussex have been dated to the Early Neolithic whilst those at Grimes Graves (Norfolk) have been dated to the Late Neolithic (Barber *et al.* 1999) and this fits in with the datable artefacts made from nodular flint in regions such as Northumberland.

The abandonment of local stone sources such as agate, chert and quartz by the Neolithic suggests more than just a switch from the self-reliance strategies of the Mesolithic. It begs the question as to why such a decision was taken, as placing greater reliance on imported materials would expose the Neolithic inhabitants to greater risk if the supply chain failed. On a practical level the greater size of the nodular flint would have allowed the more widespread use of larger tools such as knives, sickles and flint axe heads in an area like Northumberland that only had access to small flint nodules from the coast and till areas. Such items may have been considered important necessities for the new types of subsistence strategies that were employed by Neolithic groups. However, considering the social dimension, the role the raw material could have played is probably also key to understanding this marked transition. By abandoning the use of non-flint material and gaining access to high-quality nodular flint the Neolithic occupants of Northumberland would have placed themselves within the wider milieu of Neolithic cultural traditions while at the same time demonstrating their access to, and participation in, wide socio-economic networks. In other words there may have been a social kudos, or statement of identity, associated with the abandonment of some locally available materials in favour of imported nodular flint, as well as economic benefits resulting from participating in goods exchange.

As the Mesolithic assemblage includes material other than flint it is possible to break down further the relative abundance of different types of material used during this period. Figure 3.29 below shows the proportions of the 488 pieces that can be definitely attributed to the Mesolithic belonging to different rock types. Flint, chert and agate account for 35%, 32% and 31% respectively of the Mesolithic assemblage, with quartz and other material accounting for just 2%. These statistics are to some extent surprising as they indicate a virtually equal reliance on flint, agate and chert for making tools, with just opportunistic use of quartzitic material as and when it could be worked. A preference for flint could have been expected given that it is easier to work and is more aesthetically pleasing, at least to our eyes. However, these percentages tell a different story, indicating that it was just one amongst a number of locally available materials that was used in these inland valley areas. Although only a few kilometres inland, the picture here in the Till-Tweed valleys and their tributaries contrasts markedly with that for the coastal margin, where beach flint accounts for entire lithic assemblages from coastal surveys. Although the sea would have been a few hundred metres further off-shore than it is today, but certainly no more, these areas referred to here as coastal would also have been 'coastal' in the Early Holocene and therefore the use of this easily obtained resource can be expected. Overall, then, the pattern for the Mesolithic appears to be one of localised acquisition wherever possible. In such circumstances there appears to be little in the way of social or ideological conventions governing the acquisition of this material, whereas during the Neolithic groups were going to considerable effort to acquire specific materials, such as mined flint, implying that there were other factors at work in addition to utilitarian considerations.

Bearing in mind the results from the earlier study transect across the Milfield Basin (Waddington 1999), the consistency across two large landscape surveys in the same region adds considerable strength to the observation that Mesolithic groups occupying the valleys of inland Northumberland relied on a wide range of stone types, and not just flint, for meeting their task needs, and that acquisition of raw materials was structured around self-reliance and local availability. This is an important finding as it implies that groups not only had freedom of travel across relatively extensive tracts of landscape, including access to the coast, but that groups had freedom of access to the sources of raw material across these areas such as those occurring on the beach. This implies that 'ownership' of land and resources was not a formal feature of Mesolithic social organisation, although it is certainly possible that larger band or tribal groupings may have had rights of access over substantial tracts of land. Conversely, it implies that rights to resources were perhaps a more important issue for Neolithic and later groups and it is reasonable to assume that this is linked to the more sedentary existence asso-

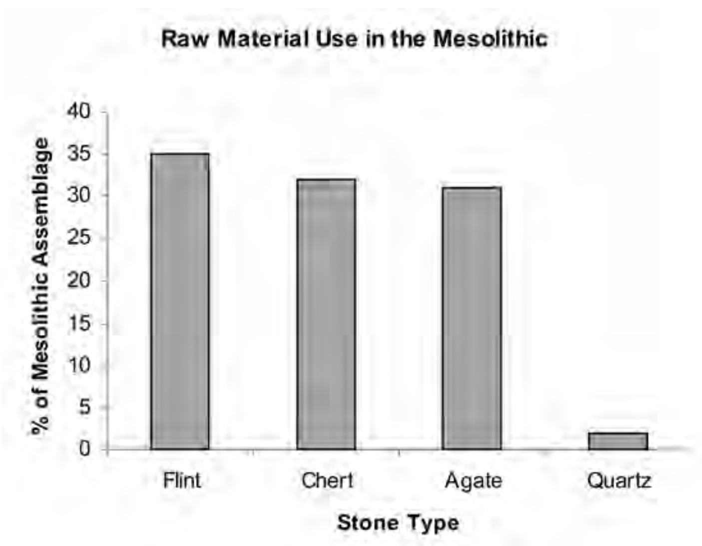


Fig. 3.29. Raw material use in the Mesolithic.

ciated with farming groups and their necessary attachment to specific tracts of land. When Neolithic groups anchored themselves to the land, either by cultivation or grazing rights, this would have created tensions over access to static resources in the landscape such as raw materials for stone tools. This need to gain access to such fixed resources may have been one of the principal factors that encouraged the creation and growth of wide-ranging exchange networks at this time, as witnessed in the lithic assemblage from this study (see above).

Artefact Types

A wide variety of lithic types is present in the fieldwalking assemblage, ranging from struck pebbles (test pieces) through to cores, flakes, blades and a range of finished tools (Figs 3.30–37). Particularly fine pieces include the outstanding collection of Neolithic and Early Bronze Age pieces from field 22 as well as some of the arrowheads and scrapers from the Hedgeley-Bewick block of fields. A probable perforated macehead (Fig. 3.36, 1680) was discovered in field 31 at St Cuthbert's Farm while a fine leaf-shaped arrowhead (Fig. 3.36, 3369) came from field 45 in the West Newbiggin block. Some classic Mesolithic pieces, including narrow-blade microliths, have come from the Tweed blocks, particularly fields 33 (Fig. 3.36, 2141), 41, and 54 (Fig. 3.36, 3635 and 3652). Table 3.7 summarises the quantity of different types of lithics together with their percentage as a proportion of the entire assemblage.

Struck Pebbles

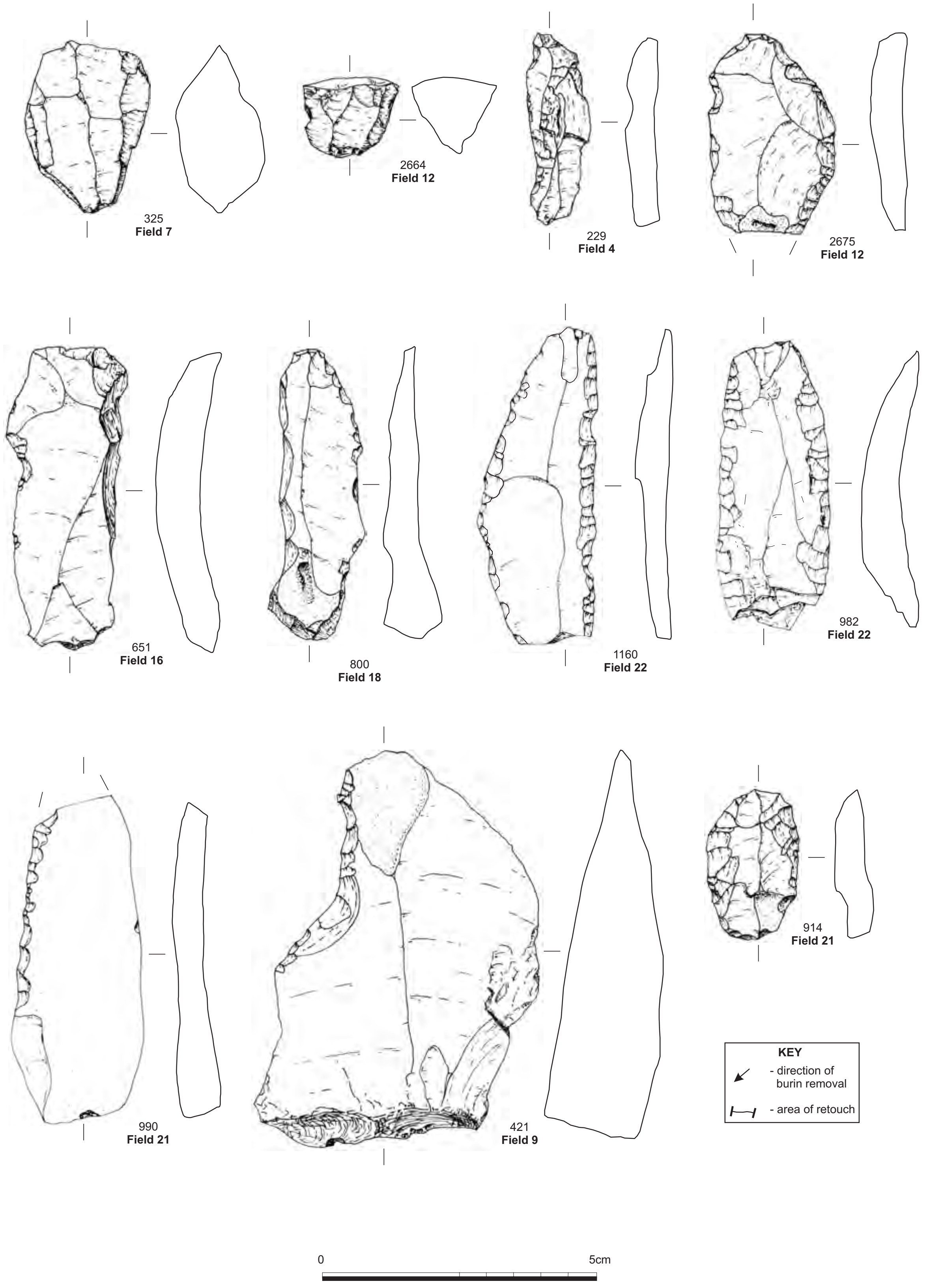
A total of 61 struck pebbles (or 'test pieces') was identified, comprising 1.8% of the lithic assemblage. They include pieces made from flint, agate and chert. The mean average length of the non-broken pieces is 34.3mm and the mean average width is 28.5mm. They usually have one or two flake facets indicating where the nodule/pebble has been tested. The presence of these artefacts in a field suggests that a source for this raw material may lie close by.

Cores

A total of 429 cores was identified, comprising 12.8% of the lithic assemblage. They include pieces made from flint, agate and chert. Most of the cores were small and many of these were clearly intended for the production of microlith-size blades. A variety of different core types was recognised including 93 platform cores (see Fig. 3.33), 29 flake cores (see Fig. 3.33), 30 multi-platform cores, 23 pebble cores, 18 bi-polar cores (see Fig. 3.30), 3 micro-cores, 3 prismatic cores (see Fig. 3.30, 2664) and 2 opposed-platform cores (see Fig. 3.33, 1583), the rest not fitting into any obvious classification. All the cores that could be confidently dated belonged to the Mesolithic.

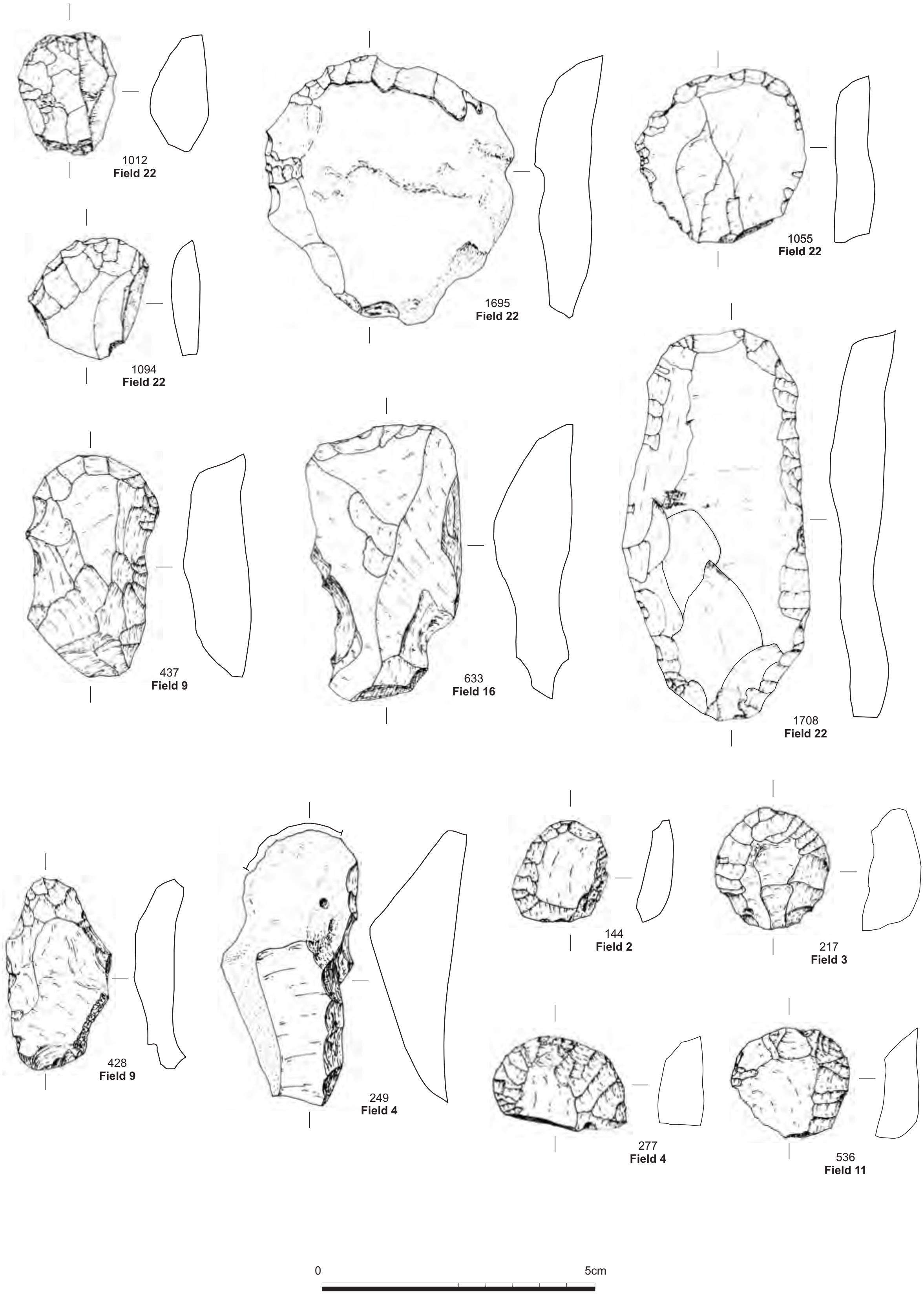
Artefact Type	Total	% of Total Assemblage
Struck Pebble/Test Pieces	61	1.8
Cores	429	12.8
Flakes	1956	58.6
Blades	371	11.1
Utilised Flakes	25	0.7
Utilised Blades	51	1.5
Edge-Trimmed Flakes	85	2.5
Edge-Trimmed Blades	53	1.6
Retouched Flakes	74	2.2
Retouched Blades	56	1.7
Scrapers	125	3.7
Microliths	20 (+ 5 poss)	0.7
Leaf Arrowheads	3	-
Barbed and Tanged Arrowheads	5	-
Transverse Arrowhead	1	-
Chisel Arrowhead	1	-
Arrowhead (unident)	2	-
Points	2	-
Serrated Blades	2	-
Knife	1	-
Awls	3 (+ 2 poss)	-
Burin	2	-
Macehead?	1	-
Whetstone	1	-
Gun Flint	2 (+ 1 poss)	-
Total	**3340**	

Table 3.7. Summary of lithic artefact types present in the assemblage.



325 bipolar platform core; 2664 prismatic core;
229, 2675, 651, 800 edge-trimmed blades; 1160 serrated blade; 421, 914, 982, 990 retouched blades

Fig. 3.30. Fieldwalking lithics from the Till catchment.



1012, 1094, 1695, 1055 scrapers;
437, 633, 1708, 428, 249 end scrapers; 144, 217, 277, 536 thumbnail scrapers

Fig. 3.31. Fieldwalking lithics from the Till catchment cont'd.

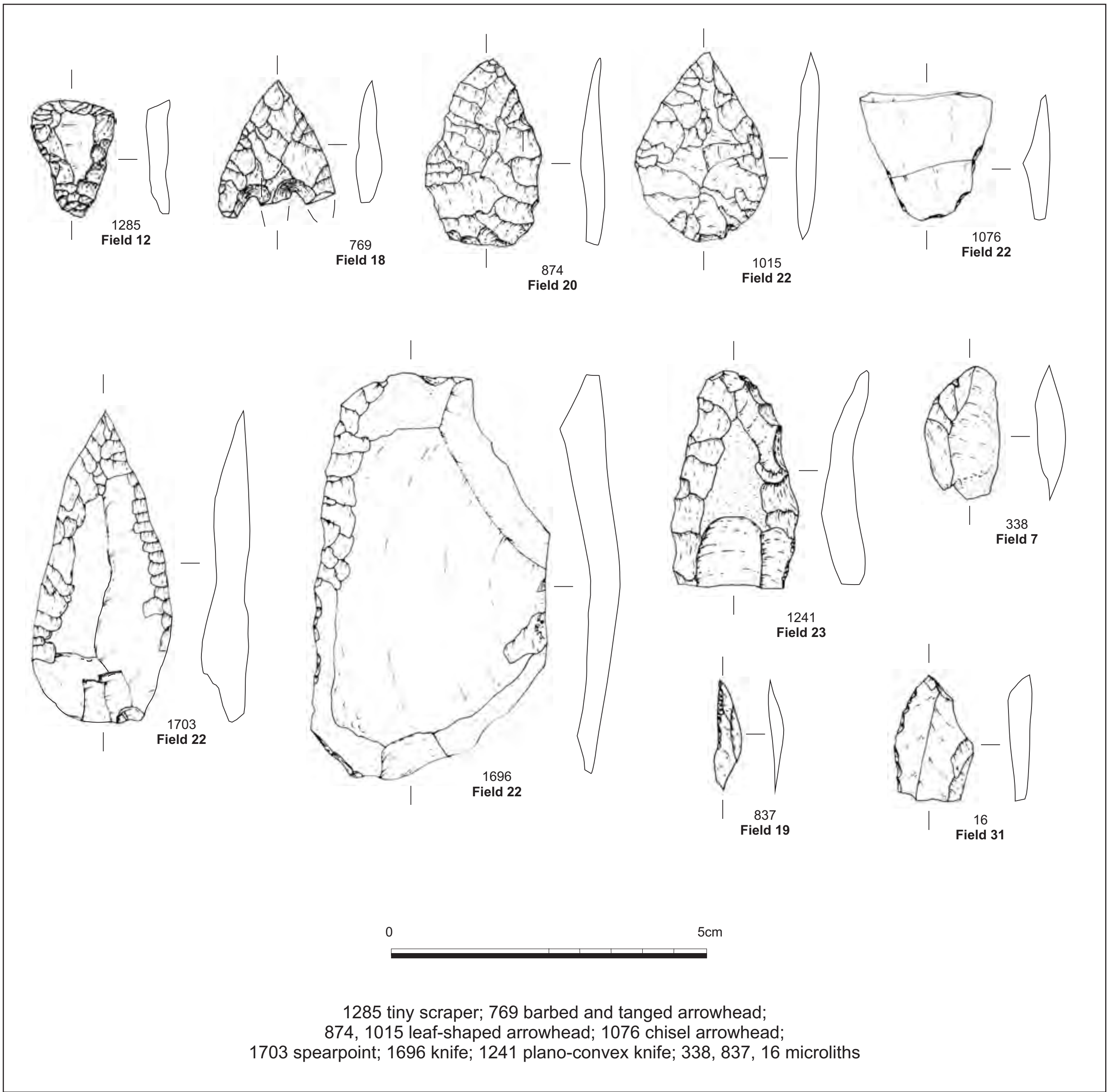


Fig. 3.32. Fieldwalking lithics from the Till catchment cont'd.

Flakes

A total of 1956 flakes was identified, comprising 58.6% of the lithic assemblage. They include pieces made from flint, agate, chert and quartz. Based on the measurements of the 613 non-broken flakes the mean average maximum length, width and thickness are 20.5mm, 24.0mm and 8.5mm respectively. These figures indicate most flakes are short, squat and relatively thick when compared to flakes typical of assemblages in flint-rich regions to the south. This can be accounted for by the fact that many of the flakes are made from chert and agate which usually produce considerably thicker and squatter flakes than their counterparts made from flint. This is directly related to the flaking properties of these different raw materials.

Blades

A total of 371 blades was identified, comprising 11.1% of the lithic assemblage. They include pieces made from flint, agate, chert and quartz. Based on the measurements of the 122 non-broken blades the mean average maximum length, width and thickness are 25.4mm, 12.9mm and 6.4mm respectively. These figures indicate blades are generally short and thick which, like the metrical statistics for the flakes, is related to the raw material and the size of nodules available for working.

Utilised flakes and blades
A total of 76 utilised flakes and blades was identified which together comprise 2.2% of the lithic assemblage. They include pieces made from flint, agate, chert and quartz. Based on the measurements of the non-broken pieces the utilised blades have mean average maximum length, width and thickness measurements of 30.1mm, 15.5mm and 6.6mm respectively. The non-broken utilised flakes have corresponding measurements of 25.8mm, 20.7mm and 9.8mm.

Edge-trimmed flakes and blades
A total of 138 edge-trimmed flakes (see Fig. 3.33, 3426) and blades (see Fig. 3.34, 3642) was identified which together comprise 4.1% of the lithic assemblage. They include pieces made from flint, agate and chert. Based on the measurements of the 24 non-broken edge-trimmed blades these have mean average maximum length, width and thickness measurements of 29.3mm, 15.7mm and 7.6mm respectively. The 38 non-broken utilised flakes have corresponding measurements of 27.0mm, 23.9mm and 9.3mm.

Retouched flakes and blades
A total of 130 retouched flakes and blades (see Figs 3.30 and 3.33) was identified which together comprise 3.9% of the lithic assemblage. They include pieces made from flint, agate and chert. Based on the measurements of the 30 non-broken pieces the edge-trimmed blades have mean average maximum length, width and thickness measurements of 33.7mm, 18.0mm and 8.9mm respectively. The 30 non-broken utilised flakes have corresponding measurements of 22.9mm, 20.5mm and 8.7mm. Some of the broken retouched blades and flakes could be segments of other formal tool types including burins, scrapers and a tanged tool.

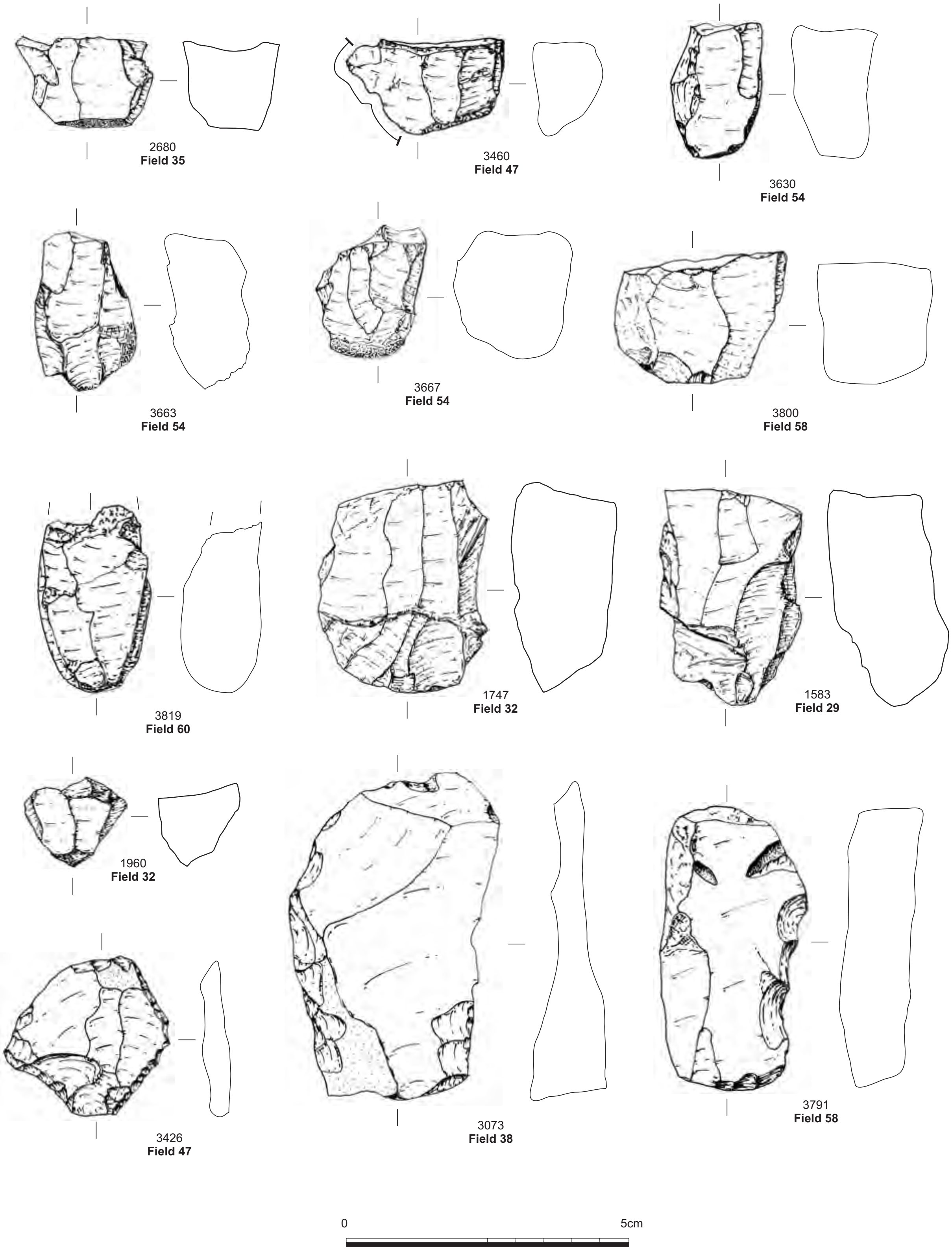
Scrapers
A total of 125 scrapers was identified, comprising 3.7% of the lithic assemblage. They include pieces made from flint, agate, chert and quartz. The mean maximum measurements of the 93 complete scrapers is 25.9mm long, 19.7mm wide and 9.8mm thick. A variety of scraper types representative of different periods are present in the assemblage including 29 end scrapers (some Neolithic and some Mesolithic) (see Figs 3.31, 3.34 and 3.35), 4 pebble scrapers (see Fig. 3.35, 3660), 10 thumbnail scrapers (likely to be Early Bronze Age) (see Figs 3.31 and 3.35) and 6 tiny scrapers (Mesolithic) (see Fig. 3.35, 1922), as well as others that could not be readily classified.

Microliths
A total of 20 microliths and five possible microliths was identified, comprising 0.7% of the lithic assemblage. They include nine pieces made from flint, eight made from chert, five from agate and one made from quartz. The types present include four scalene triangles (see Fig. 3.36, 3635), two crescents (see Fig. 3.36, 3446), two points, a backed blade, a geometric form (see Fig. 3.36, 3652), an obliquely blunted piece, a *lamelle á cran* (see Fig. 3.36, 3668) and other non-readily classifiable pieces. The mean maximum measurements of the 16 non-broken microliths is 21.7mm long, 10.3mm wide and 4.4mm thick. All these pieces are made on narrow geometrical blades and are therefore considered to belong to the later Mesolithic period.

Arrowheads
A total of 12 arrowheads and two points (see Fig. 3.35, 3100 and 3121) was identified together comprising 0.4% of the lithic assemblage. All are made from good quality flint and they include five barbed and tanged pieces (all broken) belonging to the Early Bronze Age (see Fig. 3.32, 769 and Fig. 3.36, 3796), three leaf-shaped arrowheads (see Fig. 3.32, 874 and 1015 and Fig. 3.36, 3369), together with one chisel-head arrowhead (see Fig. 3.32, 1076) and one transverse arrowhead (see Fig. 3.36, 2645), all belonging to the Neolithic. The remaining two arrowheads were broken segments and could not be ascribed to a specific arrowhead type. The leaf-shaped arrowheads average 27.8mm long by 18.3mm wide by 3.5mm thick. The chisel-head arrowhead measures 19mm long by 21mm wide by 4.5mm thick, while the transverse arrowhead measures 25.5mm long by 30 mm wide and 4mm thick. It is interesting to note that the arrowheads came from two principal clusters: five came from the fields at Hedgeley and three came from the scatter of Neolithic/Early Bronze Age material at the north end of field 22 at Akeld. Single finds came from field 45 and field 58 near to the Tweed.

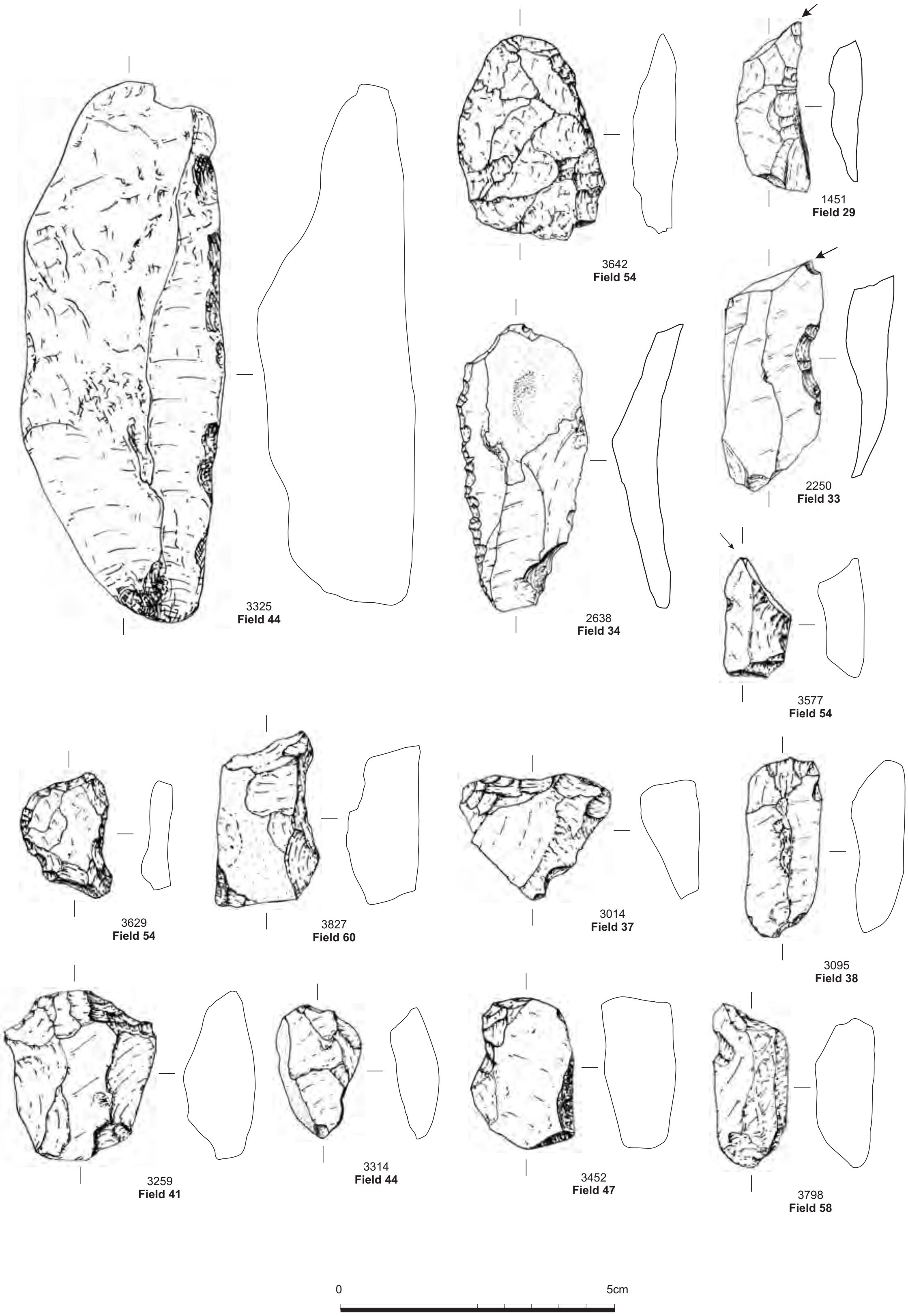
Other tools
The other tool types present in the assemblage include two serrated blades (see Fig. 3.30, 1160), a plano-convex knife (Early Bronze Age) (see Fig. 3.32, 1241), three awls (see Fig. 3.35, 3678, 3081 and 3496) and two possible awls, three gun flints, two burins (Mesolithic) (see Fig. 3.34, 3577), a whetstone and what appears to be a broken quartz macehead (Late Neolithic) (see Fig. 3.36, 1680).

Medieval pottery
There is one small early medieval pottery sherd, 39 medieval and six possible medieval sherds, 25 post-medieval and 14 possible post-medieval sherds, together with six sherds that remain unclassified. It was notable that five of the medieval pieces were found in the vicinity of Crawley Tower above the Till valley at Powburn, a derelict medieval tower house that is recorded as having been sacked by the Scots. This material, from fields 3, 4, 5 and 6, together with the coin from field 3, could have resulted from manuring and/or the disposal of refuse around the settle-



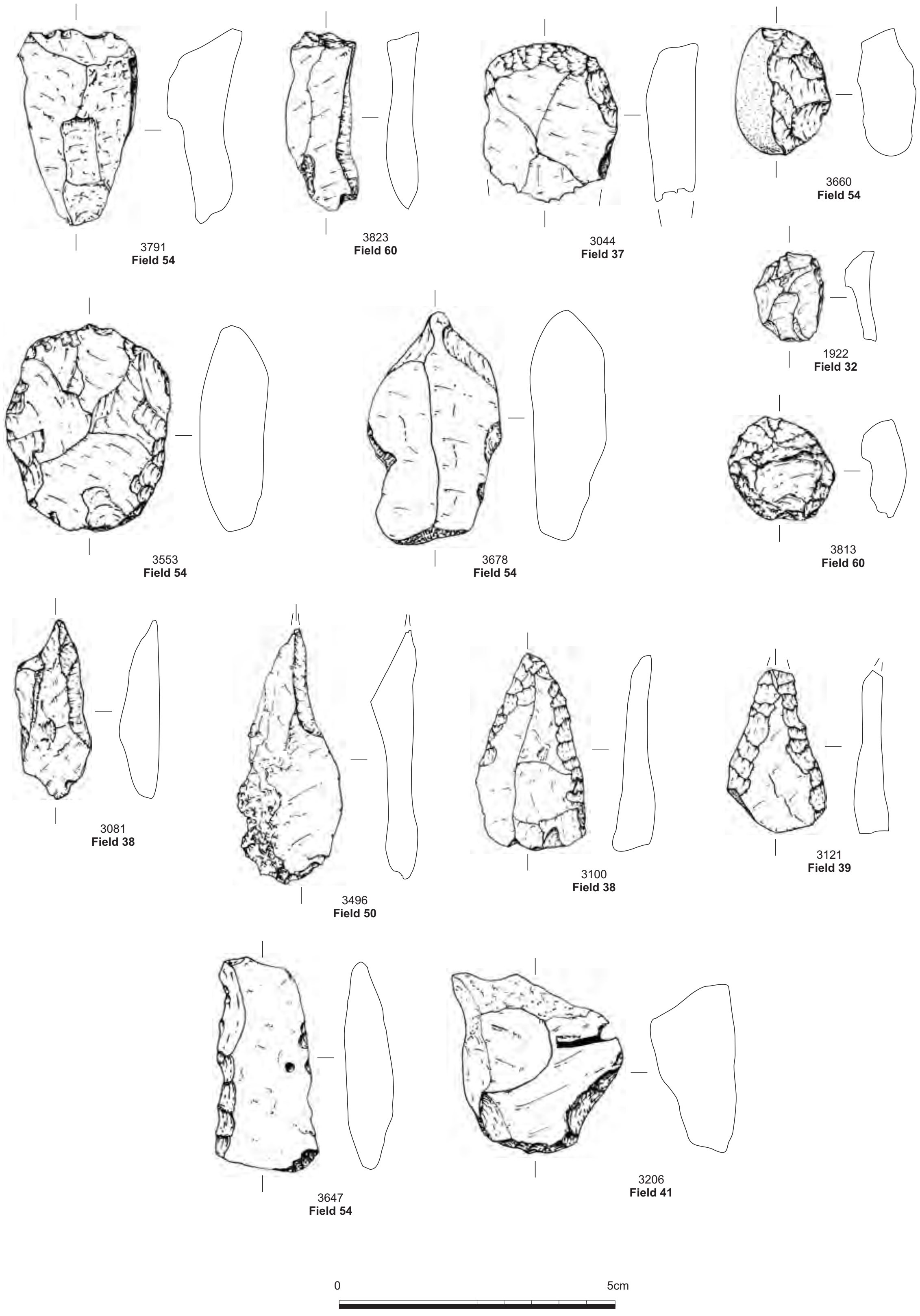
2680, 3460, 3630, 3663, 3667, 3800, 3819 platform cores;
1747 flake core; 1583 opposed platform core;1960 prismatic core; 3426 edge-trimmed flake;
3073, 3791 retouched blades;

Fig. 3.33. Fieldwalking lithics from the Tweed catchment.



3325 bruised backed blade; 3642 edge-trimmed blade;
2638 serrated blade; 1451, 2250 retouched blades/possible burins; 3577 burin;
3629, 3827, 3014 scrapers; 3095, 3259, 3314, 3452, 3796 end scrapers

Fig. 3.34. Fieldwalking lithics from the Tweed catchment cont'd.



3791, 3823, 3044 end scrapers; 3660 pebble scraper; 1922 tiny scraper;
3553 scraper on levallois flake; 3813 thumbnail scraper;
3678, 3081, 3496 awls; 3100, 3121 points; 3647 knife; 3206 cut flint

Fig. 3.35. Fieldwalking lithics from the Tweed catchment cont'd.

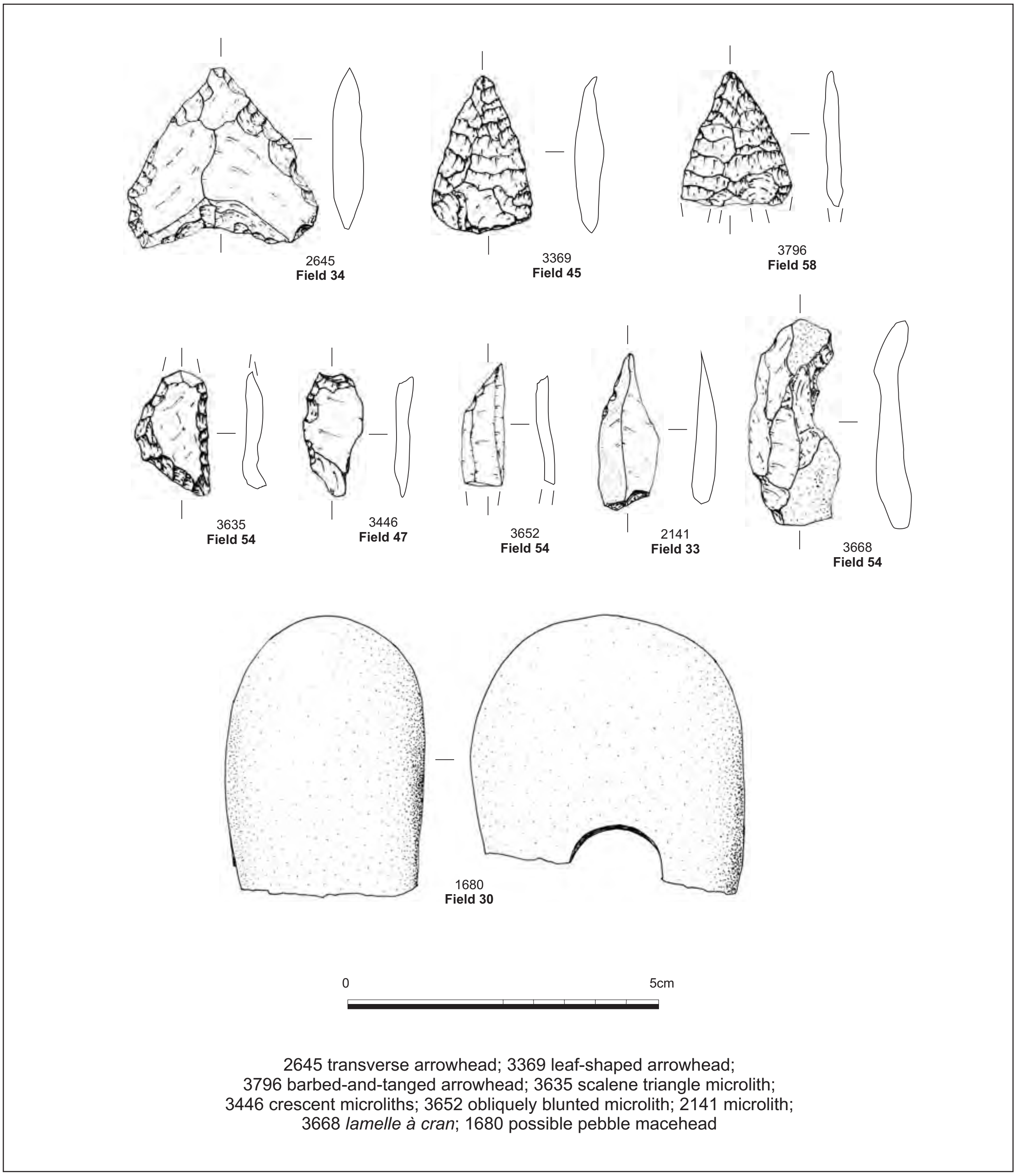


Fig. 3.36. Fieldwalking lithics from the Tweed catchment cont'd.

ment. Another possibility is that it may have resulted from the plundering and burning of the site when it was sacked.

Three sherds of probable medieval pottery were recovered from fields 24 and 27, which are adjacent to the medieval settlement of Wark-on-Tweed where the well-preserved earthworks of a medieval castle survive. Medieval and post-medieval sherds were recovered in quantities from fields 41, 43, 52, 53 and 54 at Norham, which is also home to a famous medieval castle and church, with much of the village retaining its medieval street pattern, including burgage plots. These fields lie between the church and the river and contain the cropmark remains of a deserted medieval village (see Chapter 4).

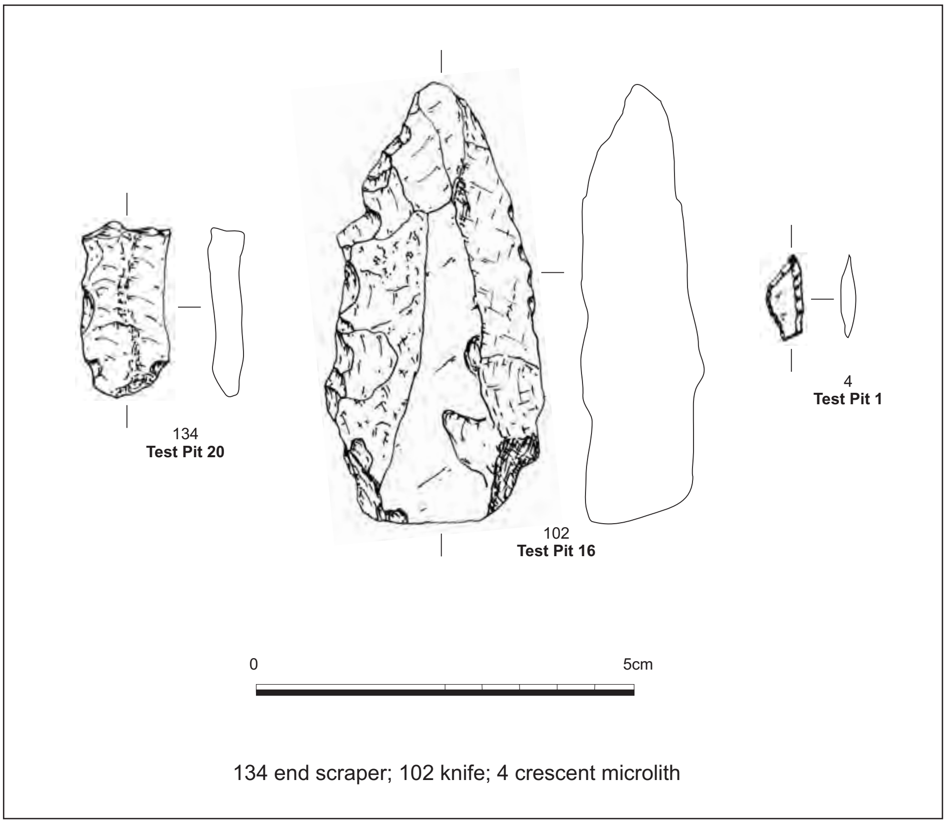


Fig. 3.37. Flints from test pits at St Cuthbert's Farm.

THE FIELDWALKING STUDY IN ITS REGIONAL CONTEXT

The fieldwalking component of this study represents one of the most systematic field surveys to be undertaken in Britain, focussing on a discrete landscape defined by natural geographic boundaries. This landscape has been sampled by this and an earlier study (Waddington 1999) so that all the main geological areas of the basin have been assessed from watershed to watershed on either side of the Till valley so as to give a continuous transect of data, as well as pockets of additional data from further up and down the valley reach. This has been undertaken in conjunction with a programme of test pitting, slope mapping and landform element mapping. Combined with the earlier study, an area of 15.6 million square metres has been sampled by fieldwalking to provide a truly landscape-scale record of Stone Age land use and settlement. The archaeological significance of these data will be explored in more detail in the forthcoming companion volume (Passmore and Waddington in prep).

There have been few research-led fieldwalking studies in North-East England, notably the studies by Tolan-Smith in the Tyne Valley (Tolan-Smith 1997), Young in Upper Weardale (Young 1987) the Durham Archaeological Survey (Haselgrove *et al.* 1988; Haselgrove and Healey 1992) and the survey along what is now the Durham coastline as part of the 'Turning the Tide' project (ASUD 1998). Other smaller-scale fieldwalking studies include that undertaken around the Mesolithic site at Howick on the Northumberland coast (Waddington *et al.* 2007). There has been a long history of flint collection and fieldwalking by amateurs in the region. The collections of Berthele in the forestry areas of north Northumberland and the Borders (Hewitt 1995), Trechman and Raistrick around Hartlepool and Crimdon Dene (Trechman 1905; 1912; 1936; 1946; Raistrick 1933; 1934; Raistrick and Westoll 1933; Raistrick and Bennett-Gibbs 1934; Raistrick *et al.* 1935), Cocks and Weyman in the Tyne Valley (Weyman 1975; 1980; 1984), Weyman around Thirlings in the Milfield Basin (unpublished archive, Museum of Antiquities of Newcastle upon Tyne), Buckley on the north Northumberland coast (Buckley 1922; 1922a; 1925), Coggins in Teesdale (Coggins *et al.* 1989) and Davies around the Newbiggin area of the Northumberland coast (Davies 1983) and also the Shaftoe and Bolam areas in the Blyth-Wansbeck catchment of Northumberland (Davies 1990; 1995) form the main collections. More recently there has been a significant increase in the number and scale of fieldwalking projects resulting from commercial archaeology. In particular this has included fieldwalking surveys being conducted in advance of extensive landscape-scale developments including aggregate extraction, housing projects, reclamation schemes, open-cast mining, pipelines and road schemes. The major fieldwalking projects that have been carried out as a result of such developments include the Middle Warren survey to the north of Hartlepool (Archaeological Practice 1996) and the Maiden's Hall survey to the west of Druridge Bay (Archaeological Practice 2001).

Not all of these data are in a comparable form and although many of the lithic collections of the amateur workers have been looked at, with the exception of the work of Davies (1990; 1995), the records cannot usually be used in a form that allows them to be compared with the results from other systematic field surveys. This is not to say that important information cannot be gained from their study but rather that comparable inferences can only be drawn from these collections after a full reassessment of all of these collections in their own right.

The results from this survey can, however, be compared with those from the other research and commercial fieldwalking surveys that have taken place in the region. Table 3.3 above shows the adjusted density counts per hectare from several other surveys. These are counts that have been multiplied to give a notional count per hectare in the same way as for this study (see above). In the case of the other projects, the amount by which these figures have been scaled up depends on the interval spacing of the walkers. It is assumed walkers observe the ground 1m either side of them, so one person every 10m would be 20% coverage and one person every 5m would be 40% coverage. These coverage rates are multiplied up to a notional 100% coverage statistic which has been calculated and presented in Table 3.3.

Different landscapes with differing access to raw materials encourage different strategies for coping with flint scarcity or abundance (Waddington 2000b, 170–1). Consequently, uncritical use of density counts as an indication of intensity and character of prehistoric settlement must be resisted as density counts are relative to the landscapes in which they are situated. Therefore, the character of lithic curation, discard and recovery biases must be assessed before an area is classified as having been intensively or non-intensively settled during prehistory. Each landscape has its own threshold for lithic densities and these can only be established once all the different geological areas of a given landscape have been sampled and recovery biases identified. In this case, Table 3.3 highlights the inherently low lithic density for the inland areas when compared to the relatively flint-rich coastal areas of North-East England. However, this does not mean that the valleys and river basins were any less densely settled during prehistory. For example, most of the lithic material from the higher-density Durham coast assemblages represents the primary and secondary stages in the core reduction sequence, while a much higher proportion of the Till-Tweed data represents the tertiary stage of the sequence. Therefore, considering Schofield's model of expected assemblage characteristics for different activities (1991, 119) which is reproduced below (Table 3.8), it is suggested that the lithic data for the Till-Tweed area indicate an area of extensive Stone Age settlement, whilst the assemblage recovered from the Maiden's Hall site to the west of Druridge Bay suggests that this was used predominantly as an extraction area with only limited evidence for settlement-related activities.

Activity	Density	Primary Waste	Tools	Cores
Settlement	Low	Low	High	High
Industrial	High	High	Low	Low

Table 3.8. Schofield's 'Expected assemblage characteristics for domestic and industrial areas assuming a policy of extra-home range production' (i.e. where flint is imported from a source area some distance from the main settlement area) (1991, 119).

Therefore, although the overall surface density of the Till-Tweed assemblage is lower than that for the coastal areas, the Till-Tweed valley corridor was probably no less intensively settled throughout the Stone Age than the coast, where primary extraction and chipping have resulted in a relative super-abundance of surface material. This, however, is in no way meant to downplay the importance of the coastal margin for hunter-gatherer-fisher groups, who clearly exploited the littoral and lived there, occupying structures built to stand for several generations – as at Howick (Waddington 2007a). Instead, this point serves to demonstrate what appears in this case to be the equal importance of inland waterways, valley floors and river basins to these same Mesolithic groups.

4 Monuments in the Landscape

Tim Gates and Alison Deegan

INTRODUCTION

The monuments of the Till-Tweed landscape can be divided into two categories: the upstanding structures that are preserved particularly well on the high ground above the ploughing limit, and the buried remains that are most prevalent on the sand and gravel terraces on the valley floors and sides. Aerial photography is the key method by which most large monuments are mapped, and, in the case of buried remains, discovered. This chapter is concerned with the buried evidence recorded from the aerial photographic study and the recognition of different classes of monuments, their characteristic features and landscape location. The first part of the chapter outlines the scope of the study and the methods used, while the second part discusses in detail the archaeological evidence from a chronological perspective.

ARCHAEOLOGY FROM THE AIR

by Alison Deegan

The detection and recording of archaeological earthworks from the air is contingent on their condition and visibility. The condition and survival of earthworks is determined by past and present land use, although natural erosion processes, deliberate destruction and ploughing can all reduce upstanding features to ground level. Furthermore, even well-preserved remains may be concealed by some types of vegetation such as gorse, heather, scrub and woodland. Most of the earthworks recorded from air photographs were revealed by the pattern of sunlight and shadow but upstanding features may also be highlighted by differential frost or snow cover, or the distribution of standing flood water. Even heavily truncated earthworks may be detected in appropriate conditions, particularly when their appearance is enhanced by changes in vegetation cover or soil tone. Specialist photographers can manipulate the available lighting conditions whilst in the air, circling monuments until the optimal balance of light and shadow is achieved. Both substantial and subtle variations in ground relief are further accentuated when viewed stereoscopically. Most stereo images are in the form of vertical photographs taken at regular intervals along linear flight lines, but stereo overlapping can also be achieved from appropriately positioned pairs of oblique views.

Air photographs may also reveal the presence of levelled and buried archaeological remains that are undetectable from the ground, either as variations in vegetation growth or marks in bare soil. The mechanism of cropmark formation is simple but the variables involved are complex. Cropmarks are variations in leaf and stalk colour and plant height and vigour, as seen from the air. Cropmarks may occur over buried and levelled archaeological features but also infilled natural features such as frost cracks and palaeochannels. Superficial treatments to the topsoil and vegetation, such as the uneven application of fertilizers, pesticides and herbicides or physical damage, may also produce cropmarks. It is the role of the air photo interpreter to distinguish those that have archaeological significance.

Cropmarks of archaeological features can form at any stage of plant growth, from germination to ripening, but the optimal conditions are met during periods when precipitation (e.g. rainfall) is exceeded by transpiration (water loss). This results in potential soil moisture deficit (SMD) and water-stressed plants (Jones and Evans 1975). A prolonged period of SMD will halt plant growth and then cause wilting of the plant leaves, stem and finally root. It is the cumulative impact of leaf wilt in particular, in large areas of crop, that is visible from the air. At times of drought, plants rooted in free-draining sub-surface deposits such as bank material may deteriorate faster than those rooted on surrounding undisturbed ground (see below Figs 4.16 and 4.30). Meanwhile plants rooted in the moisture-retentive fills of archaeological ditches and pits may thrive longer and stay greener than neighbouring plants at times of SMD (Fig. 4.6 below). Even after ripening, differences in crop height and bulk can indicate the presence of buried features where there are no visible tonal differences. Cropmarks are often clearest in large areas of homogeneous cereal cultivation but can also form in grass and some root crops.

Under appropriate vegetation, cropmarks above buried archaeological features can form readily on free-draining soils and permeable geologies, but are hindered on impermeable clays and the finer alluvial deposits that can better retain water at times of low precipitation. Plant roots are less likely to penetrate the deposits of deeply buried archaeological features and accordingly are less likely to be influenced by their presence. Consequently, deposits of alluvium and colluvium often mask earlier archaeological features.

Even once all the variables required for cropmark formation are met, the appearance of these marks can change by the day and they can disappear overnight. It takes the skill of experienced aerial photographers to produce maximum results from limited air time by exploiting their local knowledge of the developing conditions.

Parchmarks are a particular form of cropmark, usually occurring in grass at times of drought. The tonal differences between the parched plants and the rest of the vegetation cover is often stark and well-defined. Parchmarks may occur over buried stone structures, metalled road surfaces and the remains of rubble banks. In Northumberland the term parchmark is sometimes used to describe the reverse effect where, for example, an archaeological ditch is cut into highly permeable natural soils or geology and the plants on the undisturbed ground become parched in times of SMD but those growing over the ditch are able to tap the water reserves trapped in its fills and may stay greener for longer.

On bare soils archaeological features may be detected as colour and tonal variations against the background ploughsoil. Ploughing, which can penetrate the ground to a substantial depth in cases of deep ploughing and subsoiling, brings to the surface previously buried material and rotates it, exposing the cut surface uppermost. Where the plough cuts subsurface banks or infilled ditches and furrows it brings slices of these deposits to the surface; bank material will often appear lighter than the surrounding soil and ditch fill. If these slices are sufficiently differentiated from the natural plough or subsoil, they can be visible from the air.

SCOPE OF THE AERIAL PHOTOGRAPH STUDY

The project surveyed two blocks, one each in the valleys of the rivers Till and Tweed (Fig. 4.1). The areas are linked by an earlier air photo study of the Milfield Basin, carried out as part of another study published separately (Passmore and Waddington in prep.).

The Till block follows the River Breamish from Ingram, eastward to Powburn and then northward through Chillingham Park to Belford Moor (see Fig. 4.1). It covers five whole OS 1:10000 scale quarter sheets, an area of 125km^2. This area is characterised by the broad alluvial valley floor and gravel terraces and the often steep and wooded valley sides rising to hills and moorland. The south-western corner of this area lies within the Northumberland National Park.

The Tweed block follows the River Tweed from Carham, just upstream of Coldstream, to its mouth at Berwick-upon-Tweed, passing through Norham and Horncliffe. The River Till leaves the Milfield Basin at Etal and joins the Tweed at Tweedmill. Within this area, much of the north bank of the River Tweed lies in Scotland and therefore had to be excluded from this project as a result of the funding guidelines. The Tweed block consists of three whole and five part OS 1:10000 scale quarter sheets, an area of 120km^2. This section of the Tweed is characterised by a deeply incised alluvial channel, flanked by sand and gravel terraces and occasional sandstone outcrops. Within this block the land rarely rises above 90m and the moorland zone seen in the Till block is absent.

In line with the specification of the National Mapping Programme, all cropmark, soilmark and earthwork archaeological features, dating from the Neolithic through to the end of the Cold War, were mapped and recorded (RCHME 1997). The NMP specification does not seek to exclude pre-Neolithic remains but in practice the ephemeral features of the Mesolithic and earlier periods are rarely visible from the air. Certain post-medieval and modern features were excluded; in particular upstanding or levelled field boundaries that were depicted on the Ordnance Survey First Edition or later maps were not mapped. Similarly, widespread small-scale stone quarries were omitted although small limestone quarries that were associated with limekilns were mapped. Larger-scale quarries were recorded, their presence being particularly significant when in close proximity to other archaeological features. Although foundations of buildings that were visible as earthworks or ruined stonework were recorded, standing roofed or unroofed buildings or structures generally were not, unless they were associated with a larger industrial or military complex.

SOURCES AND METHODOLOGY

Three collections of air photographs were consulted: the National Monuments Record (NMR), the Unit for Landscape Modelling (ULM, formerly CUCAP) and the Museum of Antiquities (MoA), University of Newcastle. These collections contain a combination of oblique and vertical air photographs. Table 4.1 quantifies the number of photographs consulted from each collection although there is considerable duplication between collections.

The oblique photographs were mostly black and white prints from 35mm or 70mm film, but there were

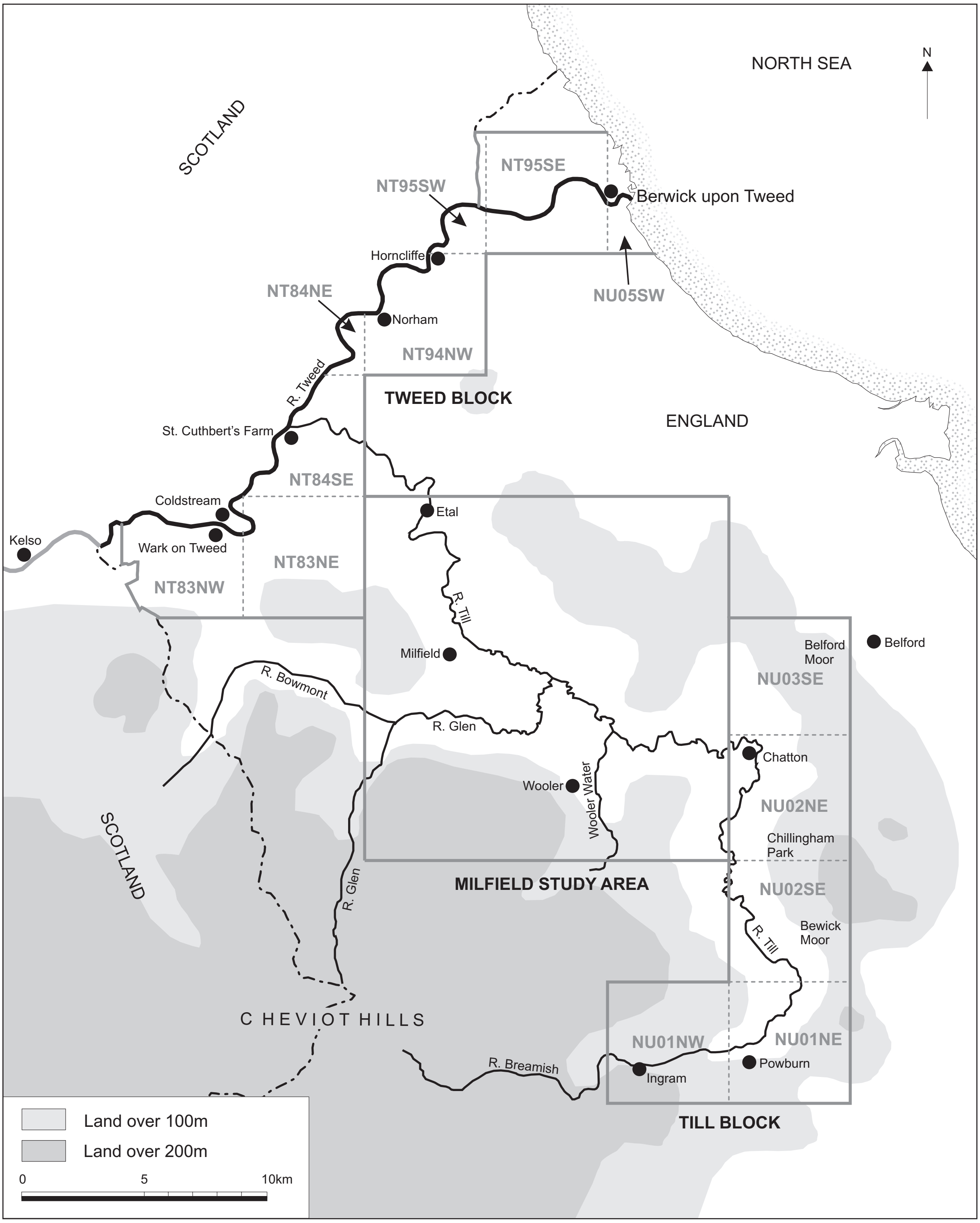


Fig. 4.1. Location plan of the Till-Tweed AP Project areas.

also a small number of colour prints from 35mm slides. Over four-fifths of the oblique photographs were the work of Tim Gates; others were taken by Norman McCord, Royal Commission on Historical Monuments (England), English Heritage, Derrick Riley, CUCAP and the Royal Commission on the Ancient and Historical Monuments of Scotland. Many of Tim Gates' photographs were overlapping stereo pairs and were particularly useful for interpreting earthworks and the finer detail of cropmark sites. Overall the standard of the specialist oblique photography was high.

Collection Name and address	**No. of photographs consulted**			
	Till block		**Tweed block**	
	oblique	vertical	oblique	vertical
National Monuments Record Enquiry no. AP52004 English Heritage National Monuments Record Centre Great Western Village Kemble Drive Swindon SN2 2GZ http://www.english-heritage.org.uk	1694	556	1004	754
Unit for Landscape Modelling Air Photograph Library University of Cambridge The Mond Building Free School Lane CB2 3RF http://www.uflm.cam.ac.uk	119	58	343	20
Museum of Antiquities University of Newcastle upon Tyne Newcastle upon Tyne NE1 7RU http://museums.ncl.ac.uk/archive/	52 (829*)	0	107 (562*)	0
Total	1865	614	1454	774

* indicates actual no. of photographs listed in the MoA online catalogue, including those duplicate at NMR

Table 4.1. Quantification of aerial photographs consulted.

Information from the relevant existing NMR and county HER records concerning both field monuments and find spots was used to inform and enhance the interpretation of the archaeological sites that were visible on the air photographs. Information from both databases was output as digital distribution maps so that the spatial relationship between the existing records and the mapped archaeology could be readily observed.

A small portion of the Till block had already been covered by a higher-level survey. The South-East Cheviots Project, undertaken by the RCHME, was an aerial photographic and photogrammetric survey enhanced by ground survey and field observations. Paper copies of the 1:2500 and 1:1000 scale plans were obtained from the NMR to assist in the NMP mapping. In practice, the absence of grid cuts and map background on the paper plans made it difficult to reconcile the planned features with those that were visible on the air photographs.

All of the available air photographs from the specified sources were examined under magnification and stereoscopically where possible. Having obtained permission from the appropriate authorities and copyright holders at the outset of the project, photographs were selected for transcription (rectification and mapping) and scanned at a suitable resolution, usually 300dpi. Where permission to scan was not forthcoming the necessary information was traced onto acetate sheets and these were scanned and rectified. The scanned images were rectified using the specialist software AERIAL5.18. This rectifies the scanned image using a 2-D projective (plane-to-plane) or 3-D geometric transformation. The accuracy of transformation depends on the precision of the control information: the correspondence between visible points on the photograph and known points on a map. Control information was derived from the Ordnance Survey raster 1:10000 maps, which were also used as a base for mapping. The accuracy of the Ordnance Survey raster 1:10000 maps is in the range of ±8m and rectification of photographs is normally within ±2.5m. However, areas of open moorland with little control presented particular problems, which could only be overcome by recourse to secondary control points, usually from the vertical photographs. For 3-D geometric transformation, which produced better results across uneven ground, Digital Terrain Models were generated within AERIAL5.18 from the OS Land-form Profile™ (5m vertical interval, 1:10000 scale).

Most features were recorded as seen with the extent of banks, ditches, pits or mounds traced by a polygon that reflected their size, shape and width in an appropriate colour convention. Although the nominal scale of mapping was 1:10000, and accuracy was constrained by the Ordnance Survey tolerances at this scale, the level of detail recorded by this project was often greater. Digital maps, with their zoom functions, allow the interpreter to record much finer details than was previously possible for hand-drafted plans. Some features were recorded schematically: ridge and furrow was depicted with a simple graphical depiction outlining the extent of the original furlongs (as far as these could be deduced) and a line to indicate the direction of ploughing. The presence of extensive industrial remains with complex or ill-defined multi-period elements and extensive twentieth century military sites was denoted by a simple outline demarcating the extent of the remains, though occasionally significant and well-defined components within these groups were recorded.

For each monument or monument group that was mapped, this project generated new NMR records or enhanced existing records. Each record contains the following information as a minimum: key geographic information, the monument types present and their dating (as far as these could be deduced), the nature of the evidence, a free text description of the monument or monument group, the source of record information (i.e. photograph and any bibliographic or cartographic references) and administrative details such as concordance with HER records, record authorship, and links to events and archives.

OVERVIEW OF MAPPING RESULTS

A broad range of site types is present in the Till and Tweed blocks, ranging from a possible Neolithic enclosure to a modern radio station with high-frequency direction finder. The results of the aerial photograph study may be measured in terms of its contribution to the NMR and county HER records. The project created 254 new NMR records for archaeological sites and made 218 enhancements to existing records (Fig. 4.2). Of the 472 records created or amended it appears that 268 were not recorded in the digital records of the Northumberland HER at the outset of the project.

In the Till block, many of the prehistoric and Roman earthworks on Bewick and Belford Moors were already well represented in the NMR. However, this project has made a significant contribution to knowledge of the medieval and later industrial remains in these landscapes, which previously were largely unrecorded. The mapping has consolidated and enhanced the previously rather scant record of the levelled pre-medieval landscapes on the lower valley sides. The area in the very south-west of the Till block has been the subject of a previous survey and consequently the incidence of new records in that area is very low.

In the Tweed block, many of the levelled and upstanding prehistoric and Roman sites that lie along the river terraces were already represented in the record but it was sparser for the higher slopes and has now been significantly enhanced by the project's mapping and recording. The profusion of new sites around Berwick-upon-Tweed mainly documents post-medieval and modern military sites and serves to illustrate the benefit of the NMP's breadth of scope.

The maps and records created by the project are the copyright of English Heritage. Access to the project data may be obtained by writing to the following: National Monuments Record, English Heritage, National Monuments Record Centre, Great Western Village, Kemble Drive, Swindon, SN2 2GZ. The NMR AMIE Parent Collection UID number is EHC01/027 and the NMR AMIE Event UID number is 1378874.

BACKGROUND TO ARCHAEOLOGICAL AERIAL PHOTOGRAPHY IN NORTHUMBERLAND

by Tim Gates

The air photographic data on which this report is based are the product of more than six decades of work by a small handful of dedicated individuals and organisations. The accompanying map overlays, plotted at 1:10000 scale, were drawn up from an archive which now consists of more than 3300 specialist oblique photographs and 1400 non-specialist verticals, the latter mainly consisting of post-war RAF split-vertical photography. The resulting maps supersede plots prepared manually 25 years ago by Stewart Ainsworth, then working on secondment from the Ordnance Survey, as a part of a more substantial contribution to the Northumberland County Sites and Monuments Record. In the intervening period a considerable amount of new photographic data has accumulated, particularly with regard to cropmark sites, and the new maps provide a welcome opportunity to discuss this material and to study individual sites and their relationships in the context of the broader landscape.

The requirements of the project funding have meant that the survey is split into two blocks covering parts of the lower Tweed and upper Till river valleys. A third survey area, comprising the Milfield Basin and its immediate surroundings, has also been recently mapped. This fills the gap between the Tweed and Till blocks and will be the subject of a chapter in the companion volume to this study (Passmore and Waddington in prep.).

Particularly in so far as prehistoric and Roman period sites are concerned, the number of sites investigated by excavation in this area is very small in relation to the total now on record. For this reason, in the majority of cases we can do no better than fall back on morphology as a guide to chronological context, with all the uncertainties that this implies. As will be evident, the attempt to categorise sites by morphological type produces results that are sometimes of questionable validity, but the exercise is not without interest and may at least provide some windmills for others to tilt at.

One area of difficulty concerns the commonly made distinction between those late prehistoric settlements which are thought to be defensive in character and

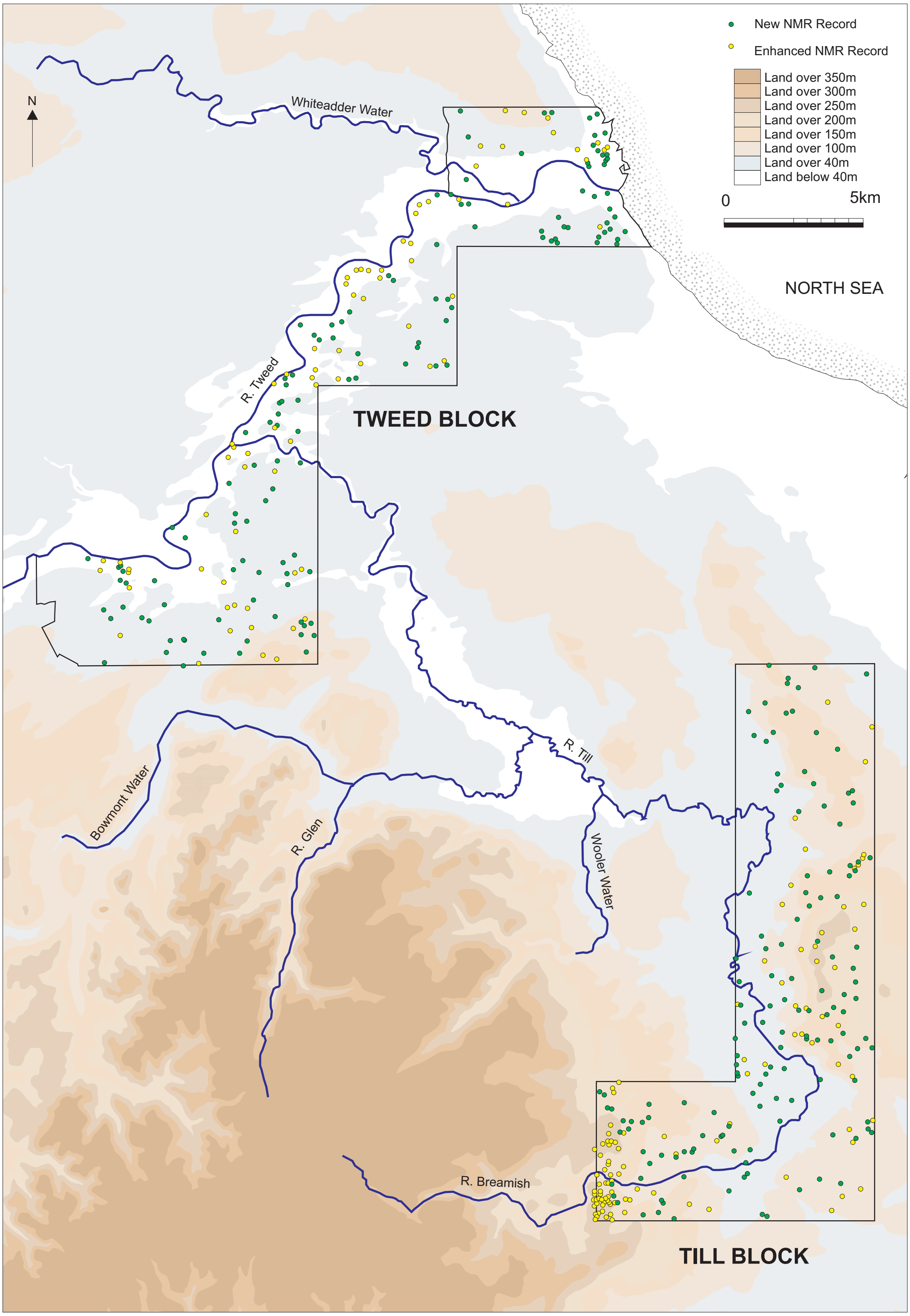


Fig. 4.2. Distribution of the new and enhanced NMR records generated by the Till-Tweed AP Project.

those which are not. In the case of multivallate enclosures recorded only as cropmarks such a distinction largely depends on the spacing between the ditches, close-spaced ditches normally being taken to indicate a multivallate settlement with a defensive purpose. However, this does not imply that all the lines of defence were necessarily in use at the same time or, where development over time is implied, by what process of expansion or contraction the site arrived at its final state. On the other hand, where single-ditched enclosures are concerned, no such clear distinction can be made and for this reason it is more or less inevitable that some univallate forts or defended settlements will have been included in the accompanying lists along with sites that are essentially non-defensive in character.

On a similar theme, it is now commonly recognised that many prehistoric settlements (whether defensive in character or not) were positioned in such a way that their earthworks would look as impressive as possible when looked at from the surrounding landscape and from neighbouring sites. Depending on the local topography, the desired result could sometimes be achieved with surprising economy of means, giving rise to earthworks that are of relatively modest stature. As will be evident, effects of this kind cannot readily be appreciated from air photographs, or even from published maps, and there are undoubtedly many instances where fieldwork would add to our understanding of the often subtle interplay between sites and their topographical setting.

In addition to recognisable settlement sites, air photographs also provide extensive, if fragmentary, evidence for the existence of prehistoric land boundaries and field systems. In cultivated lowland areas these invariably take the form of ditches or pit alignments recorded as cropmarks. By contrast, fields demarcated by stony banks or walls, and in some instances actual evidence of cultivation in the form of cord rig, are not infrequently met with in the form of upstanding earthworks on unploughed moorlands within the survey territory. Good examples can be seen on the high grasslands which flank the gorge of the River Breamish where it emerges from its mountain fastness above Ingram village. In whatever form they present themselves, however, most of these early field boundaries are discontinuous and do not form coherent patterns over large tracts of landscape. At the same time, to the extent that it is possible to infer any sort of context for this evidence, the majority of them would seem to belong to the late prehistoric and Roman periods, implying a greater degree of organised land management at this period than has so far been apparent, especially in lowland parts of the county.

One advantage of CAD technology is that it is now possible to measure the dimensions and internal areas of the larger settlement enclosures with reasonable accuracy. As part of this project the internal areas of a sample of settlement enclosures have been measured to the nearest 0.01 ha (or $100m^2$) and the results are presented in a series of tables which accompany this report. Here the intention is to determine the extent to which size may be useful as a means of distinguishing between sites which for other reasons might already be thought of as functionally or chronologically distinct. Where cropmark sites are concerned, however, it should be remembered that these measurements are necessarily based on the area contained within the innermost ditch and thus take no account of the existence of now vanished banks and ramparts. If an approximation of the area once occupied by an internal bank or rampart is subtracted from the tabulated figures, the effect in some cases would be to reduce the amount of usable space by 50% or more. Also, because the ratio between the diameter of an enclosure and its internal area is not a constant one, even a modest reduction in the former will lead to a disproportionately large reduction in the latter. Accordingly the size estimates presented here should be understood as providing no more than a rough and ready basis on which to make comparisons.

As part of the standard National Mapping Programme procedure, each individual site – or, where more appropriate, each group of sites – has been allotted a unique identification number (UID) to which is attached a National Monument Record monument report including a full description of the feature(s) involved. For the sake of consistency, sites referred to in the text are likewise identified by their UID numbers and where appropriate also by an eight-figure grid reference. The information contained in the summary lists (Appendix F) has been culled from these monument reports with only occasional minor additions.

RECONNAISSANCE HISTORY

> The higher ground along the sides of the valleys retains numerous traces of works which have been almost entirely obliterated by cultivation. Aerial photography would no doubt reveal others not now to be observed on the ground, and would in any event bring out in known examples features either unnoticed or not properly understood.

These prescient words were written seventy years ago by J. D. Cowen as part of his introduction to the prehistoric section of volume XIV of the 'History of Northumberland' (Hope Dodds 1935, 33) whose coverage includes the valleys of the rivers Breamish and Till downstream as far as Milfield. What Cowen's statement shows is that the potential of aerial photography to reveal hitherto unsuspected sites and to increase understanding of those already known was already well appreciated in the North in the mid-1930s. Here the problem was not a failure to anticipate the value of this relatively new technique of archaeological exploration. Rather it was the lack of a local enthusiast with the resources and expertise of an Alexander Keiller or a Major Allen who could undertake the practical business of archaeological air photography in this region. In an attempt to remedy this situation efforts were made, through both official and unofficial channels, to obtain suitable photographs direct from the RAF, but in the event these met with no more than limited success. Meanwhile, by way of illustration, vertical photographs of hillforts at Old Bewick and Doddington Moor were included in the volume from which the above quotation is taken (Plates III and IV). As was stated in the text, both photographs were taken by the RAF at the explicit request of the Committee of the Northumberland County History for the purposes of the volume and were the first aerial photographs of prehistoric sites in Northumberland to be published.

With the passage of time it became increasingly obvious that it would never be possible to use RAF training programmes as a way of obtaining specialist archaeological cover on any meaningful scale. Accordingly, as the war in Europe drew to a close, attempts were made to find an independent means by which archaeological air reconnaissance could more readily be accomplished. Eventually, with enthusiastic backing from the newly formed Council for British Archaeology, and the cooperation of the RAF, Dr J. K. S. St Joseph took up the challenge and in 1945 set out on his career as an aerial archaeologist, which was to last for more than 40 years.

So far as the area covered by the present survey is concerned, with the sole exception of the two sites mentioned above, the first archaeological air photographs were taken by St Joseph during the course of his first flight over Northumberland on 20 July 1945. On this occasion he was following the course of a Roman road – the Devil's Causeway – northwards towards Berwick when he photographed a cropmark of a double-ditched enclosure at Springhill (NU 0011 5064), just 2km south of the mouth of the River Tweed where, so far as is known, the road ends. At the time it seemed likely that this particular site might represent a Roman fort and in due course it appeared as such on the third edition of the OS 'Map of Roman Britain' published in 1956. The fact that it is now recognised as a hillfort of pre-Roman origin reflects the advance of scholarship and in no way detracts from the value of the original discovery as a first indication of the unexpectedly high potential of the main river valleys and the coastal districts of Northumberland for the production of cropmarks.

Operating under the auspices of the Cambridge University Committee for Aerial Photography (CUCAP), St Joseph made regular flights over the valleys of the Till and the Tweed in subsequent years. More often than not, these flights were planned as part of an annual pilgrimage to Scotland, taking place with almost clockwork regularity in the second or third week of July so as to coincide with the expected peak of the cropmark season north of the Border. St Joseph's main research interest was in Roman military archaeology, a subject in which he had been deeply involved since the early 1930s when he began a long and fruitful collaboration with Ian Richmond. Richmond at this time held a Lectureship in Romano-British Archaeology at King's College, Newcastle, where he remained until 1956. In the early years, which is to say from 1945 until 1956, St Joseph also received financial support from the Christianbury Trust, a Newcastle-based charity set up by Sir Walter Aitchison of Coupland Castle near Wooler for the specific purpose of promoting archaeological research in the Border counties of England and in Scotland. While Sir Walter's generosity more or less ensured that Northumberland in general, and the Milfield area in particular, received its fair share of attention from the air in the early post-war years, there was certainly no reduction in the level of reconnaissance after his death in 1954. Indeed CUCAP flights undertaken by St Joseph, and also by David Wilson from 1963 onwards, continued to make a vital contribution to the archaeological exploration of this territory until increasing financial pressures brought research-based flying from Cambridge more or less to a close in the late 1980s.

While the ending of regular flights from Cambridge is certainly a matter for regret, any adverse impact that this might otherwise have had on our accumulating knowledge, particularly of cropmark sites, has to some extent been offset by the development of locally based flying programmes within the North-East region itself.

The first of these flights took place as early as 1956 and were undertaken by Dr Peter Salway, who at that time was a post-doctoral research student at Newcastle. Salway's flying was primarily concentrated on the Roman Wall and attendant Roman military sites in the south of the county, and it was not until the late 1960s and early 1970s that the field of operations was extended to cover that part of northern Northumberland with which we are concerned here. By this time, responsibility for archaeological air photography had passed to Dr (later Professor) Norman McCord who, as an economic historian, considerably broadened the scope of this work to include not only archaeological monuments of all kinds, but also industrial sites and buildings, farms and urban landscapes. McCord summarised his approach in a paper contributed to a book of essays published in honour of Professor George Jobey (McCord 1984), with whom he had earlier published two important papers presenting some results of recent air photography in Northumberland (McCord and Jobey 1968 and 1971). The second of these papers is of particular relevance here because it demonstrated for the first time in print the rich potential offered by northern parts of the county in terms of the production of cropmarks, especially on gravel subsoils in the upper reaches of the Till valley and northwards as far as the Milfield Basin. Sites discussed included several multiple-ditched forts of suspected Iron Age date and a number of single-ditched enclosures which, it was thought, might be the equivalent of those late prehistoric and Romano-British settlements which at that time were better known as earthworks in Redesdale and North Tynedale and as cropmarks on the coastal plain south of the River Wansbeck. As it happens, it was during the summer of 1971, while the second of these papers was in the press, that the important Anglian settlements at Thirlings and New Bewick were first recorded, though the true significance of the cropmarks at New Bewick did not finally become apparent until more than a decade later (Gates and O'Brien 1988).

Commencing in the spring of 1977, the task of carrying out regionally based archaeological air photography fell to the present writer as the recently appointed Department of the Environment Field Officer for Northumberland. In that capacity and later as an independent flyer, almost 200 sorties have been carried out from airfields in the North-East up to the time of writing (2005). Of these, almost exactly half, amounting to more than 300 flying hours, have been devoted to the search for cropmarks and parchmarks in Northumberland. In the course of this work, all the territory covered by this survey has been regularly monitored.

While a detailed account of the contribution made by air photography to our understanding of Northumberland's historic landscape lies well beyond the scope of this contribution, some basic statistics, gathered over the 20 year period from 1977 to 1996, may help to put this work into perspective and give some idea of the scale of the new discoveries that have resulted.

Consider, for example, the following two diagrams, which show first the absolute number of cropmark sites recorded in the county year on year (Fig. 4.3), and second the number of sites newly discovered in each successive year as a proportion of the total number recorded, starting from zero in 1977 (Fig. 4.4).

For the purpose of this exercise, the term 'site' covers a limited range of monument types, such as ring ditches or settlement enclosures, which are relatively easy both to recognise and to count, but excludes other cropmarks, such as linear ditches and pit alignments, which are less easily quantified. While the resulting figures therefore have only limited validity in terms of the absolute number of sites involved, they nevertheless offer a convenient means of gauging the productivity of one season's flying against another, and of illustrating variations in the rate at which new cropmarks come to light over a period of time.

Here, two points require clarification. In the first place, because it has been my normal practice to record, either photographically or in writing, all the cropmark sites that were visible in any given year, regardless of whether they had previously been recorded or not, the data can be used to make objective comparisons of the results obtained in different years. Thus the number of 'new' sites recorded in any given year relative to the total number that were observed should accurately reflect the situation as it actually existed on the ground at the time.

Secondly, thanks to the generosity of the various funding bodies, there were nearly always sufficient funds to allow regular reconnaissance to continue through until harvest or to the point where it seemed that further work would not be justified. Even in exceptionally productive years, such as 1989, 1992 and 1994, the necessary financial resources were almost always found – often at very short notice – to make best use of the opportunities offered by a rapidly changing situation, largely through the efforts of staff employed by the former RCHME and latterly by English Heritage who have contributed most generously over the years.

As Figure 4.3 demonstrates, the number of cropmark sites recorded year by year over the period in question has varied enormously. Excluding four years when, for a variety of mainly organisational reasons, no summer flying took place (1983, 1985, 1991 and 1993), numbers have ranged from only 7 in 1987 up to 348 in 1994. This variation is, of course, very much what one would expect given the crucial part played by the weather in cropmark formation, combined with the unpredictable effects of crop rotation and changing land use.

Figure 4.4 shows the proportion of 'new' sites recorded in successive years and illustrates the difference between what may be described as 'good', 'poor' or 'average' seasons. As will be evident, certain years stand out as especially productive, most notably 1977, 1989, 1992 and, above all, 1994. Indeed 1994 was easily the most prolific year for cropmarks in North-East England since specialist air photography commenced in 1945, yielding almost 350 cropmark 'sites', of which no fewer than 171 (49%) had not previously been recorded. Again, while the proportion of new sites ranged as high as 30–55% in 11 out of the 16 years in which summer flying took place, it is no less true that the steady accumulation of new sites in less good years has contributed almost 40% of the overall total. In the light of these figures it is apparent that there are very few years in which flying did not contribute a worthwhile number of new sites. Moreover, given the continuing high number of new sites even after half a century of reconnaissance, it is clear that we have not yet reached the point where diminishing returns might call into question the need for further flying. On the contrary, the potential for making new discoveries appears to be as high now as it has ever been.

In view of the facts outlined above, it need hardly

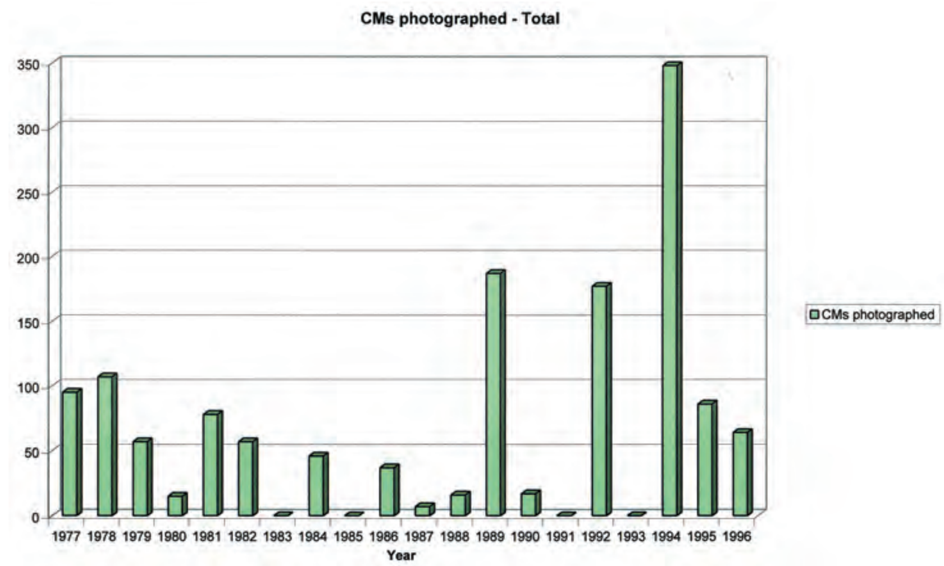


Fig. 4.3. Numbers of cropmark sites recorded annually in Northumberland, 1977–96.

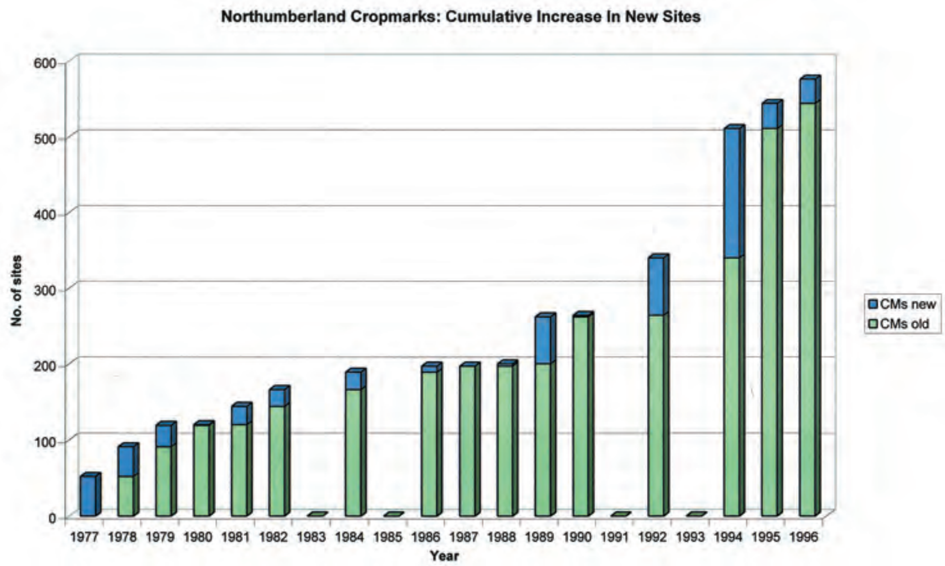


Fig. 4.4. Proportion of cropmark sites newly recorded in Northumberland, 1977–96.

be said that we need to be very cautious before accepting as archaeologically sterile areas of arable land where no cropmarks or other features of interest are depicted on the maps produced for this project. Especially where destructive land use changes, such as deep ploughing or gravel quarrying, are in prospect, remedial measures should be undertaken as far in advance as possible, including perhaps targeted air survey (see Chapter 7). For it is an absolute certainty that many important sites have yet to be discovered in fields which now appear blank on the map overlays. Indeed, in situations where ditches or pit alignments appear to stop short at modern boundaries we can confidently predict the existence of buried, but so far unrecognised, features in adjacent fields. At the same time it has to be acknowledged that our ability to recognise small features, such as pits or post holes, from air photographs is strictly limited, so that even where cropmarks have been photographed the story they tell may be far from complete. To this extent, cropmark evidence must be thought of as maintaining a bias in favour of certain types of site at the expense of others.

With regard to the particular territory under review, there is a sharp distinction to be drawn between, on the one hand, those areas of unimproved grass or heather moor where settlements and field systems survive most abundantly in the form of upstanding earthworks, and, on the other, arable farmland where medieval and later ploughing has erased the surface traces of all but the most resilient sites which can now only be identified as cropmarks or, less frequently, as parchmarks or soilmarks. Areas which now favour the survival of earthworks include the high grasslands overlooking the Breamish valley above Ingram and the dry heather moors that clothe the dipslopes of the Fell Sandstone escarpment to the east of the Till above Chatton and Bewick. In localities such as these, we can find a whole range of prehistoric monuments, including settlement sites, burials and field systems, which are entirely unrepresented in the so-called 'zone of destruction', where they have been levelled by centuries of ploughing. Again, there are certain classes of monument, including pit alignments and *Grubenhäuser*, which have so far only been identified in the form of cropmarks. Such contrasts are very largely the result of recent land use history and do not necessarily reflect genuine differences in the pattern of ancient settlement.

THE NEOLITHIC AND BRONZE AGE LANDSCAPE

Neolithic enclosures

In addition to the Late Neolithic/Early Bronze Age 'ritual complex' discovered in the Milfield plain as a result of aerial photography, one cropmark site has been added to the record which may be relevant to this period. The site in question is located on the south bank of the Tweed, *c.*400m east of the village of Wark (NT 8307 3856; UID 1382481), and can tentatively be identified as a Neolithic mortuary enclosure. This monument, first photographed by CUCAP in 1974, takes the form of a sub-oval ditched enclosure with two distinct breaks, each 10m to 15m wide, in the north and north-east facing sectors (Figs 4.5 and 4.6).

Visible within the enclosure are three slots or short lengths of ditch which could be explained either as foundation trenches for upright timbers or else as quarry ditches for a now vanished mound. Indeed, on certain photographs a roughly circular patch of deeper soil can just be made out within the space enclosed by the three trenches which may represent the residual traces of an upcast mound. Superficially, at least, the monument resembles some Neolithic mortuary enclosures that have been recorded in other parts of England, from Lincolnshire southwards (Jones 1998). It is also interesting to note that a relatively high concentration of lithics has been recovered from the field in which this monument is situated, including some pieces which appear to be of Neolithic date (Chapter 3 this volume).

Stone settings

What may be a Late Neolithic or Early Bronze Age stone setting has been identified by field survey (Basil Butcher and Philip Deakin, pers comm) and from air photographs as part of this study on Whinny Hill, a sandstone ridge which forms part of the moorlands lying to the east of Chatton (NU 0934 2752; UID 1382047). The monument consists of four upright stones and appears to be a hitherto unrecorded example of a 'four-poster' type stone circle, of which two have previously been recorded in Northumberland, at the Goatstones in the North Tyne valley and the Three Kings near Byrness in upper Redesdale (Burl 1971). More recently, the Doddington Moor stone circle has likewise been reclassified as a setting of 'four-poster' type (Waddington 2004, 46–7). Although the Whinny Hill stone setting is the first to be claimed in this particular area, the ridge on which it stands is occupied by an extensive cairnfield, containing over 90 individual clearance cairns, in addition to two Bronze Age burial cairns and an enclosed cremation cemetery (Fig. 4.9).

Pit alignments

Pit alignments, which in our area have been recorded exclusively as cropmarks, have come to be recognised as a persistent component of the archaeological landscape of northern Northumberland as well as the adjacent Scottish Borders. In Northumberland, pit alignments have been recorded as far south as the urban fringes of Newcastle, though their distribution as known at present is heavily concentrated in the Till and lower Tweed river valleys (Fig. 4.7). Here, pit alignments are most commonly associated with gravel subsoils and one reason why they do not appear with the same frequency elsewhere could be because they are less easy to identify on the heavier deposits of till which predominate on the coastal plain and in the south-east part of the county.

To date, the only published excavations of pit alignments in Northumberland are those undertaken at Redscar Wood (see this volume, Chapter 5), Ewart 1 (Miket 1981; NT 958 318) and on a double pit alignment at Milfield North (Harding 1981). In the case of the Ewart 1 alignment, six consecutive pits were excavated, between them yielding some forty sherds of Neolithic Grooved Ware pottery. On this basis, the excavator has suggested that the pits themselves might also be of Neolithic date. However, since excavations on the nearby Anglian settlement at Thirlings revealed pits and post holes from which quantities of Grooved Ware were also obtained (Miket 1987), the possibility that the pottery from the Ewart pit alignment may in fact be residual must be considered. This said, Waddington has made the point that the Ewart alignments circumscribe an area around the Ewart henge and possible mortu-

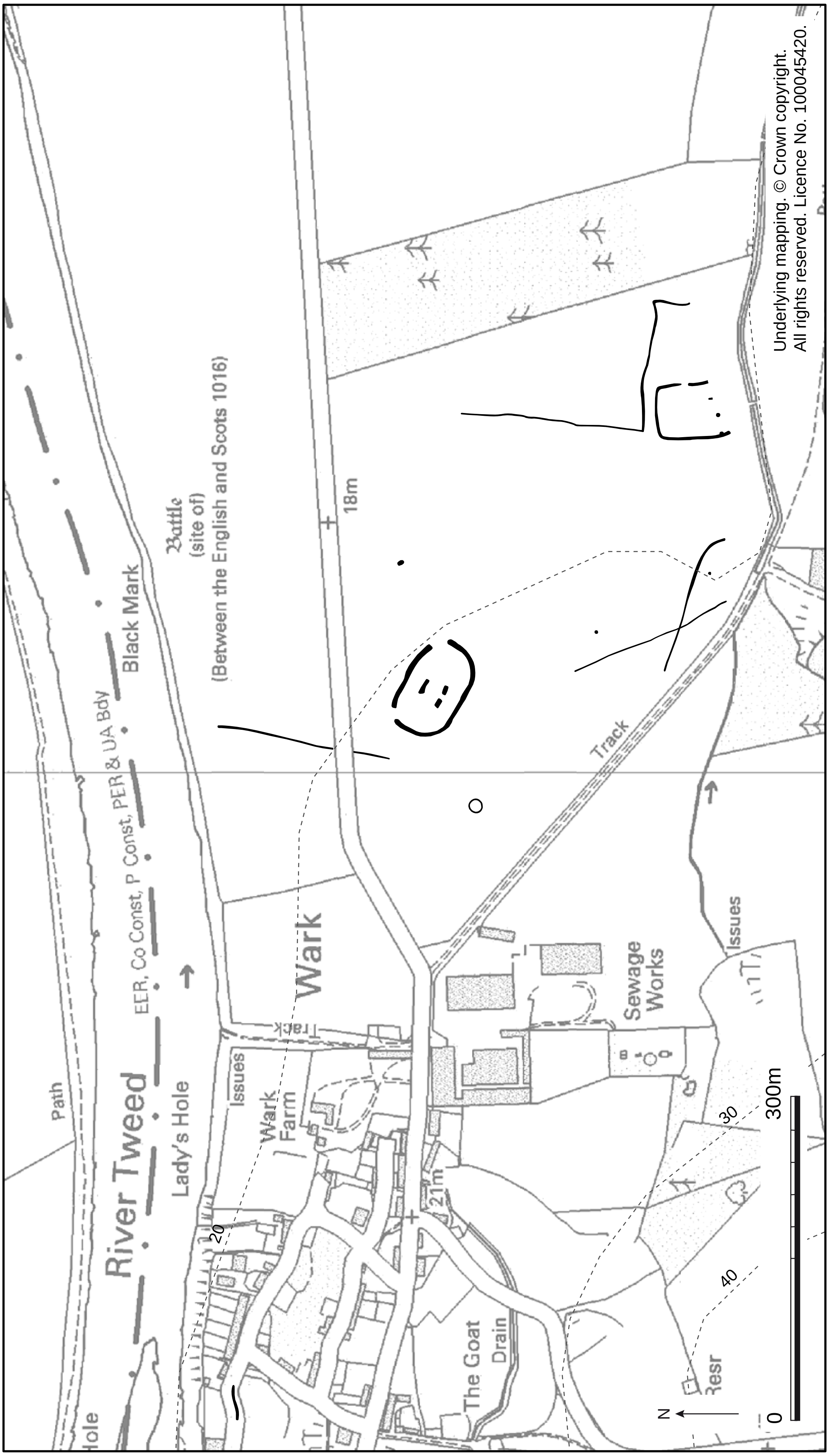


Fig. 4.5. Plan of the suspected Neolithic mortuary enclosure at Wark East. Enlarged.

Fig. 4.6. Cropmark of a possible Neolithic mortuary enclosure at Wark East.

ary enclosure, and this positioning may in itself be suggestive of a Neolithic date (Waddington 1997b). If, for the time being, the situation at Ewart 1 remains to a certain extent obscure, a Late Neolithic context for a double row of paired pits associated with the henge at Milfield North is more assured (Harding 1981, 115–19). Here the pairs of pits are spaced on average 4m apart and the row as a whole has been traced over a distance of about 180m, including one long gap of 30m. Two pits were excavated and three radiocarbon dates, obtained from charred wood in pit 2, range from 1740 to 2460 cal BC (at 95.4% confidence), suggesting that the pits were contemporary with the use of the nearby henge. Interestingly, the same pit yielded a handful of Grooved Ware sherds which, in the excavator's view, must be regarded as redeposited material. Both of the excavated pits held timber uprights which, it was suggested, may have been used for sighting southwards through the opposed entrances of the henge in the direction of Yeavering Bell. Clearly it would be wrong to interpret the double row of pits at Milfield North as a 'pit alignment' in the sense of a land boundary, but rather as an avenue that forms part of the henge monument complex.

While it is true that a Neolithic or Early Bronze Age context has been demonstrated by field survey for a pit alignment on Ebberstone Low Moor in North Yorkshire (Ainsworth and Oswald, 1999), in the light of what has been said above the case for equally early contexts in Northumberland must be regarded as equivocal, pending further investigation. On the other hand, there is a growing body of evidence to indicate that at least some pit alignments in this area belong in the late prehistoric or Roman periods (see below, Chapter 5).

Cairnfields

As mentioned above, cairnfields are some of the most common field monuments that are likely to be met with in upland parts of Northumberland and numerous examples, consisting of anything from half a dozen to well over one hundred individual heaps of stone, have been recorded on the Fell Sandstone moors and the grasslands of the Cheviot hills, where they have remained beyond the reach of later ploughing (Jobey 1968a). While it is generally assumed that small cairns of this order are the by-product of stone clearance for agriculture rather than funerary practise, genuine burial cairns, distinguished by their more regular shape and occasionally also by the presence of visible kerbstones, frequently occur in the same vicinity. Where they co-exist in the same general area, there is usually no way of telling from the surface evidence whether the burial monuments and clearance cairns are broadly contemporary or not.

With regard to the present survey, experience shows that aerial reconnaissance and photography is not a reliable means of identifying cairnfields, or, in situations where some of their constituent cairns can be picked out, of determining the extent of the area that has been cleared of stone. On that part of the Chatton and Bewick moors covered by OS quarter sheets NU 02 NE and SE, for example, field survey has located at least ten groups of small cairns which cannot be made out on any of the available air photographs and so do not appear on the transcriptions produced for this report. Again, even where some cairns are visible on air photographs, as for example under a light covering of snow, estimates of the num-

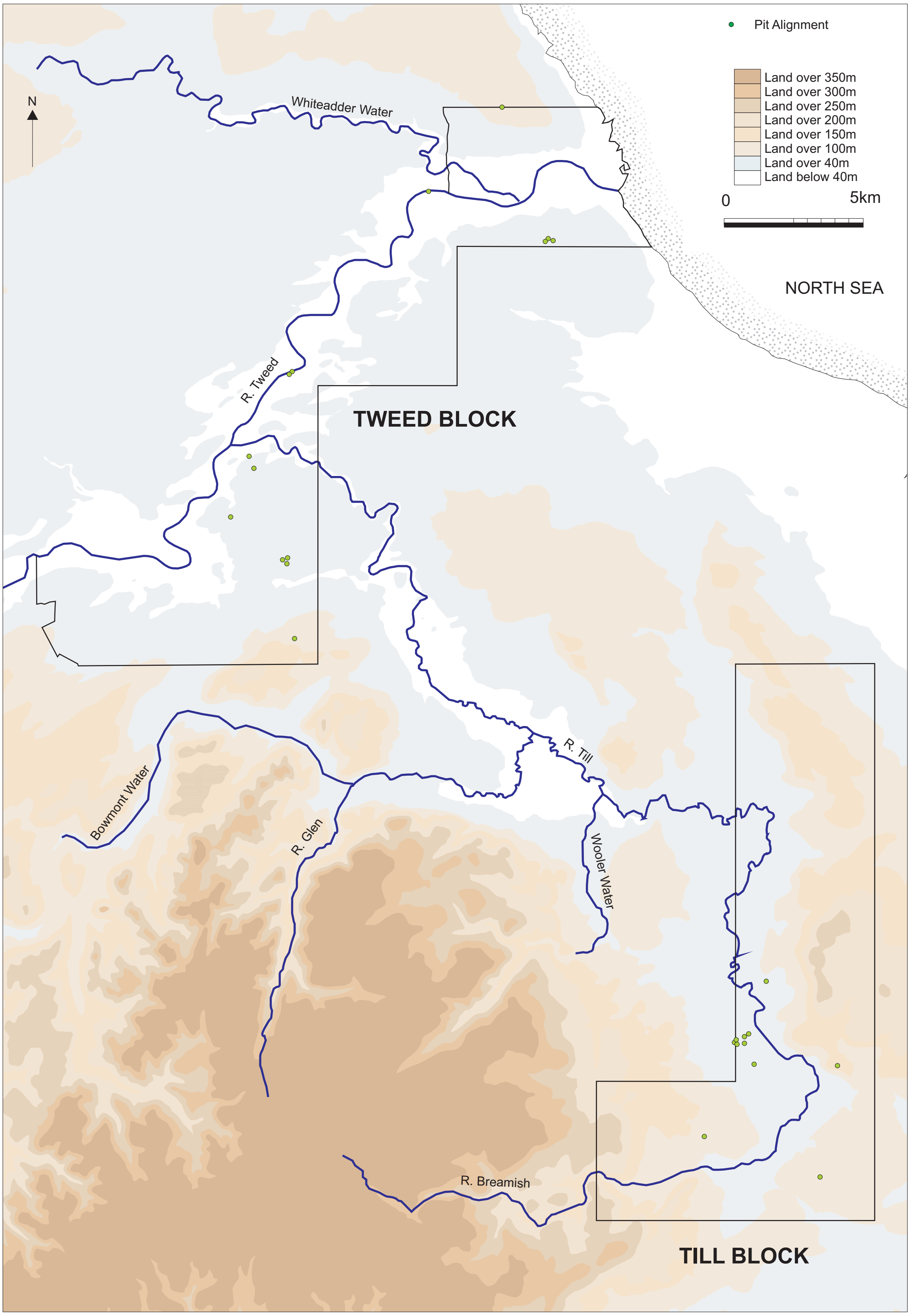


Fig. 4.7. Distribution of pit alignments (cropmarks).

bers involved invariably prove too low by comparison with what can be observed on the ground, often by a factor of two or more. For this reason, where cairnfields are threatened by changes in land use, the limits of clearance should wherever possible be established by field survey.

Where the high Fell Sandstone moors are concerned, cairnfields and Bronze Age burial monuments often constitute the only visible signs of prehistoric activity, while identifiable settlement sites of the late first millennium BC and the Roman period are conspicuous only by their scarcity. In the territory under review, several well known hillforts and defended settlements, including Harehope Hill, Old Bewick, Hepburn Crags and Ros Castle, occupy strategic positions on the moorland edge and command wide views over lower ground to the west. By contrast, the hinterland to the east constitutes a void so far as Iron Age or Romano-British settlements are concerned. Here, apart from a small handful of settlements of unenclosed roundhouses (see below), for which contexts in the Late Bronze Age or Early Iron Age might reasonably be envisaged in at least a proportion of cases, there is little or nothing in the way of identifiable habitation to fill the span of more than two and a half millennia which extends from the later Bronze Age to the Middle Ages or beyond into the post-medieval period.

As described above, the situation on the Fell Sandstones contrasts sharply with that which exists on the moorlands of the Cheviot massif, where settlements of late prehistoric and Romano-British date may extend several kilometres beyond the present limits of cultivation, reaching altitudes well in excess of 300m. While the causal factors underlying these differences in distribution remain to be fully investigated, it could well be that degradation of the inherently fragile Fell Sandstone soils is likely to have played a significant role, whether this came about by means of purely natural processes, human agency or, more likely, by a combination of the two.

In excavations carried out by George Jobey on a cairnfield at Millstone Hill (UID 5541; NU 089 261), a radiocarbon date of 1690 ± 90BC (Har-1942) was obtained on charcoal from an old land surface sealed beneath a clearance cairn (Jobey 1981). As Jobey pointed out, this date compares closely with a date of 1560 ± 70BC, corresponding to the first of a series of 'small temporary clearances' detected in a pollen diagram for Camp Hill Moss, which lies only a little more than 1km from Millstone Hill (Davies and Turner 1979). In this same diagram, similar small-scale clearance horizons continue sporadically into the Late Bronze Age or very early Iron Age, after which there is a period of regeneration lasting until some time in the Middle Ages. This picture accords well with the relatively sparse upstanding archaeological evidence for settlement on the Fell Sandstones during the late prehistoric and Roman periods.

At Millstone Hill Jobey also excavated three small, drum-shaped cairns of a type for which dates ranging from 975 ± 50BC to 1058 ± 40BC have been obtained at Claggan in Argyll (Jobey 1981). Unfortunately, although charcoal samples were collected from the land surface beneath these burial cairns and submitted for radiocarbon assay, they do not in fact seem ever to have been processed. This leaves open the interesting question of whether the cairns were in fact constructed on land that had already been exhausted from the point of view of productive agriculture. Certainly this was the excavator's provisional view, and would not be surprising as podzolisation of these inherently fragile soils could well have begun at an early stage and would in any event have accelerated during the widely documented climatic deterioration which set in during the Late Bronze Age.

Apart from the three cairns on Millstone Hill, only three other funerary monuments within the survey territory have been excavated, or in the case of Blawearie re-excavated, in recent times. At Turf Knowe, two cairns (only one of which, on Turf Knowe itself (UID 1034469; NU 0077 1564), was visible prior to excavation on air photographs) have been shown to have gone through a complicated sequence of development. In both cases, cist burials were accompanied by Early Bronze Age Food Vessels, and one cairn (on the North Knoll) also has secondary burials in the form of multiple cremations, one of them an infant placed inside an enlarged Food Vessel (Frodsham and Waddington 2004, 176). A possible parallel for this exists at Green Knowe in Peebleshire, where unaccompanied cremations inserted into a pre-existing Early Bronze Age cairn have been dated to the early first millennium BC and may therefore be contemporary with the adjacent unenclosed platform settlement (Jobey 1980). In the case of Turf Knowe, there are several unenclosed settlements in the vicinity which might likewise provide a context for these secondary burials.

At Blawearie (UID 5748; NU 0815 230) a kerbed cairn, 11.0m in diameter, which had been dug into by Canon Greenwell in 1865, was re-excavated in the 1980s (Hewitt and Beckensall 1996). As at Turf Knowe, this cairn proved to have gone through a complex sequence of development covering a lengthy, if undetermined, period of time. All told, it contained six cists and several cremation burials, both unaccompanied and in urns. Associated finds included Food Vessel pottery and a necklace of jet beads. In the light of what has been said above about the difficulty of identifying small cairns from the air, it is unsurprising that none of the ten-plus 'satellite cairns' recorded in ground survey at Blawearie are visible on air photographs.

A list of extant burial cairns in the survey area accompanies this report (Appendix F) and Figure 4.8 shows their distribution. On the summit of Titlington Pike (NU 088 159), a group of four cairns includes one exceptionally large example with a diameter of 24m. Cairns of this size are not particularly common but may sometimes, as here, form the nucleus of impressive cemeteries involving a number of smaller satellite cairns.

In addition to these burial cairns, the survey territory contains three probable enclosed cremation cemeteries, which, by analogy with excavated examples elsewhere, may likewise be of Early Bronze Age date (Jobey and Newman 1975). The monuments in question are situated to the south of Brough Law (NU 0007 1580; UID 1033865), at Old Bewick (NU 0719 2165; UID 5791) and on Whinny Hill (NU 0960 2797; UID 5527; Fig. 4.9): all three are portrayed on Figure 4.8.

While *ditched* burial mounds and funerary monuments are notably scarce in the form of upstanding monuments in Northumberland, they are not entirely absent and several examples have been recorded in the vicinity of the Iron Age palisaded settlements at High Knowes (Jobey and Tait 1966). Here, two ditched monuments, both less than 10m in diameter, were excavated and yielded pottery and other finds consistent with dates in the Early Bronze Age. In one case (burial no. 3), the ditch was hengiform on plan, with opposed entrances and a slight external bank. In the other (burial no. 4), the ditch was circular and contained a low mound. Given the very slight stature of these monuments and others in the same group, it seems extremely unlikely that any traces, above or below ground, would have survived even a single ploughing. Nevertheless, examples such as these may hint at the nature of some of the smaller ring ditches which have been recorded as cropmarks in lowland parts of Northumberland, some of which have already been shown to have had a funerary or ritual purpose (Miket 1985).

Ring ditches

Excluding ring grooves and ditches contained within the defences of Iron Age forts or later settlements, which in all probability represent the foundation trenches of timber roundhouses, approximately 50 sites in this category have been recorded as cropmarks in the survey area (Appendix F; Fig. 4.10). While some of these undoubtedly mark burial monuments, others seem more likely to represent unenclosed roundhouses. Indeed, the range of possible interpretations does not stop here and, depending on the location, may even need to be extended to take in a variety of recent agricultural monuments such as turf-built stack stands and sheep stalls, or perhaps even circular clamp kilns in areas where limestone outcrops at the surface.

Where pits can be identified at or near the centre of a ring ditch, its identification as a ritual or burial monument may reasonably be assumed. At Groat Haugh (c. NT 890 454; UID 1383408 and 1383413), for example, there is a cluster of ring ditches with centrally placed pits which for this reason seems very likely to represent a prehistoric cemetery.

At Riffington Hill, south-west of Norham (NT 8870 4437; UID 1385190), two semi-circular arcs of ditch almost certainly represent an unusually large ring ditch with an estimated diameter in the order of 40–45m. These same cropmarks coincide exactly with the site at which seven cist burials were discovered a century ago. Although the air photographic evidence leaves open the question of whether or not the burials were covered by a cairn or mound, it can safely be assumed that this ring ditch represents a funerary monument of some kind.

On the assumption that ring ditches with diameters greater than *c*.20m are unlikely to represent roofed buildings, a few sites of this order can be provisionally identified as ritual or burial monuments, unless perhaps these are round houses contained within the ditch that do not show up as cropmarks. At present, there are three sites in this category: UID 1384053 at NT 8652 3664; 138323 at NT 8992 4677 and 1380598 at NU 1380598. In the case of the latter site, the ditch seems to be relatively broad in relation to its diameter and is also interrupted by what may be an entrance on the north-east facing side. On this basis, it can tentatively be identified as a possible Class I henge.

As has been suggested above, some smaller ring ditches can most readily be accounted for as unenclosed timber roundhouses. Sites in this category include a group of cropmarks at Low House West (UID 1383264; centred at NT 9410 5180; Fig. 4.11), as noted previously (Gates 1983). Here, a succession of unenclosed timber roundhouses, marked variously by ring ditches or by crescent-shaped marks corresponding to platforms cut into the slope, is strung out along the contour overlooking the River Tweed. Interestingly, a pit alignment can be seen cutting across the line of houses, intersecting with one of the platforms in such as way as to suggest that it post-dates the building in question.

As would be expected, settlements of unenclosed roundhouses surviving as earthworks are restricted to areas which lie beyond the limit of medieval or later ploughing (Appendix F; Fig. 4.10). In field survey most settlements of this order have been found to consist of between one and five houses, though larger groupings with up to a dozen house sites, variously represented by ring grooves, ring ditches or ring banks, are not unknown (Gates 1983). In about one third of cases, these settlements are accompanied by irregular field plots or by groups of small cairns denoting stone clearance for agriculture. One settlement, at Harehope Burn 1 (UID 5838; NU 0847 2401), comprising the visible remains of three timber roundhouses, is situated in close proximity to patches of cord rig – the only example of this form of

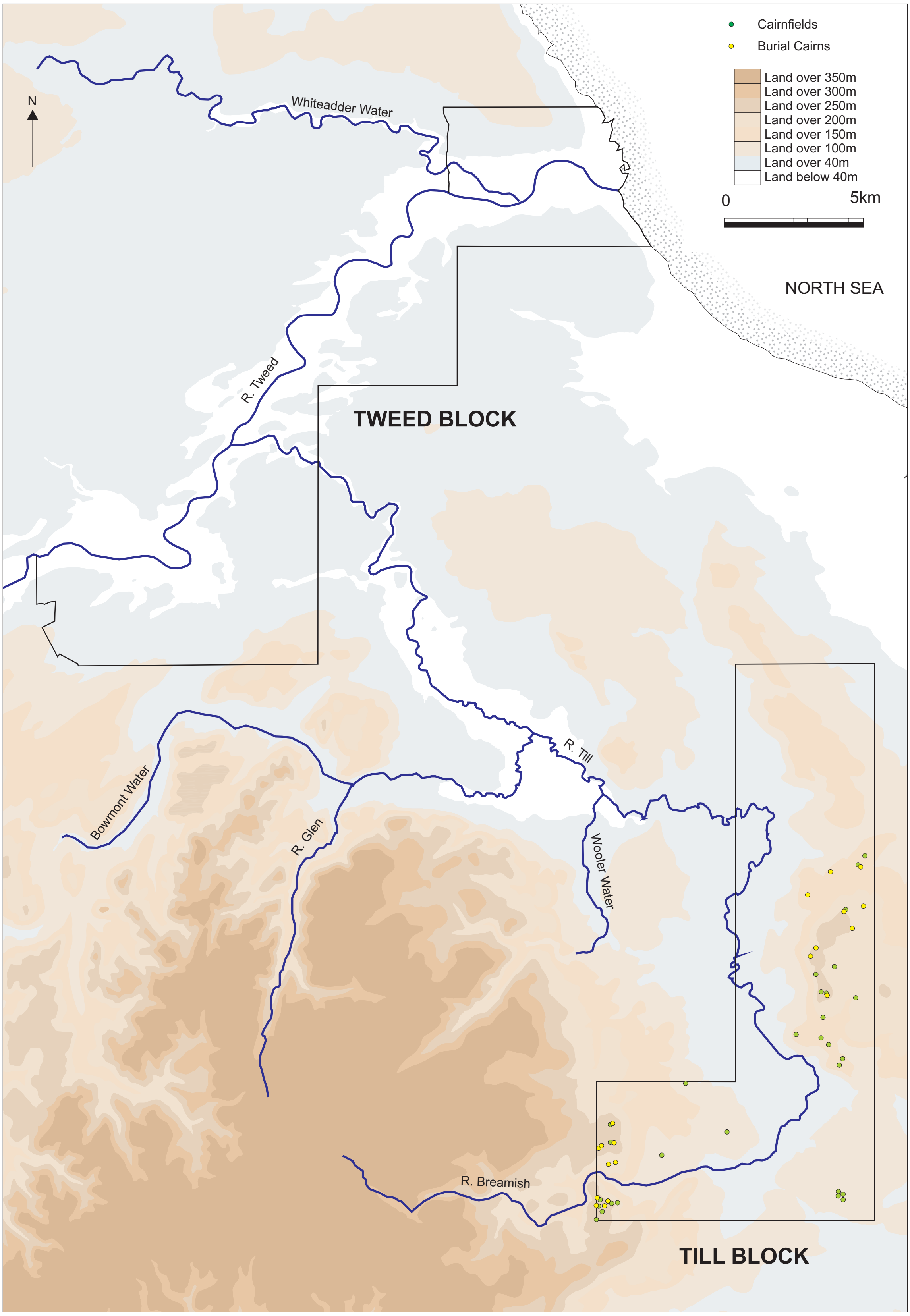


Fig. 4.8. Distribution of cairnfields and Bronze Age burial monuments.

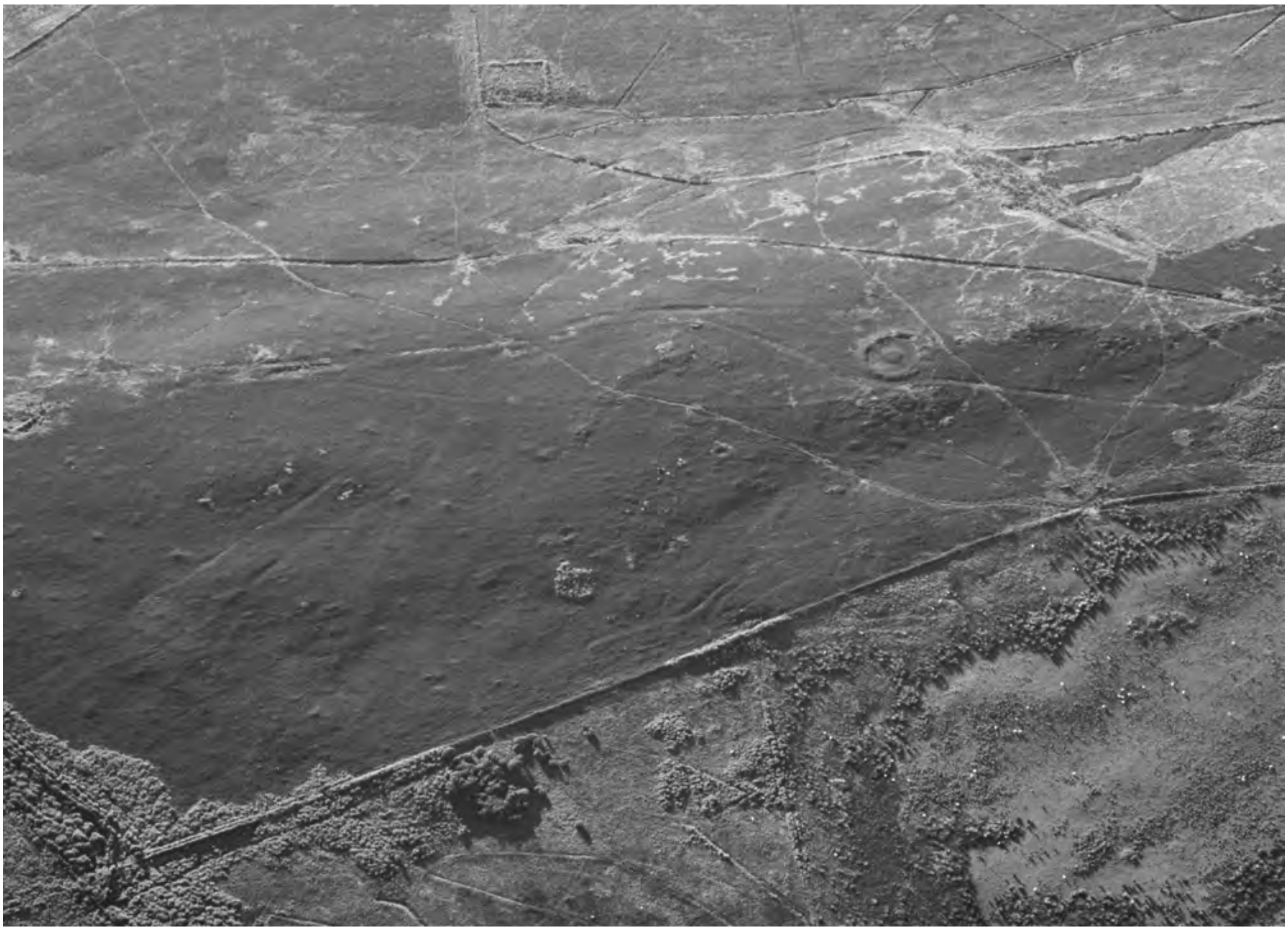


Fig. 4.9. Scattered cairns and an enclosed cremation cemetery at Whinny Hill, Chatton.

cultivation so far recorded in the territory covered by this survey.

Radiocarbon dates obtained from a small number of excavations in Northumberland and the Borders already demonstrate that settlements of unenclosed roundhouses were current over a period of more than a millennium, from *c*.1800BC to 400BC (Gates 1983; Jobey 1985). Indeed, an even longer currency for this basic form of settlement can be anticipated on the basis of preliminary reports of excavations at Pegswood near Morpeth and at East Brunton on the north-west outskirts of Newcastle, where complex Iron Age settlements involve one or more phases of unenclosed settlement (Proctor 2003; Steve Speak pers comm).

THE IRON AGE AND ROMAN LANDSCAPE (*c*.800BC to 500AD)

Palisaded settlements

In the region between Tyne and Forth, the first appearance of settlements protected by free-standing palisades of timber uprights is thought to have taken place in the Late Bronze Age or the Early Iron Age and dates so far obtained for settlements of this type indicate a flourishing in the first half of the first millennium cal BC (Jobey 1985, Fig. 10.4). In Northumberland, the earliest dates for palisaded settlements come from Fenton Hill, where a radiocarbon determination of 690 ± 100BC (Har-825) is associated with the Phase I palisade (Burgess 1984), and from Huckhoe, where a date of 510 ± 40BC (GaK-1388) relates to one of two lines of palisade, which immediately preceded the construction of a stone-walled fort (Jobey 1968b, 293).

Within the limits of the present survey a total of eleven curvilinear palisades has been recorded, with varying degrees of confidence, either in the form of cropmarks or parchmarks (Appendix F; Figs 4.12 and 4.13). At the time of writing, none of these sites has been investigated further and their status and context must therefore be a matter for conjecture, although two sites have been evaluated within the Milfield study block (see below, Chapter 5). On the other hand, where excavations have been undertaken on hillforts in the region between Tyne and Forth, a high proportion proved to have been constructed on sites previously occupied by palisades. This being the case, it could well be that the distribution pattern

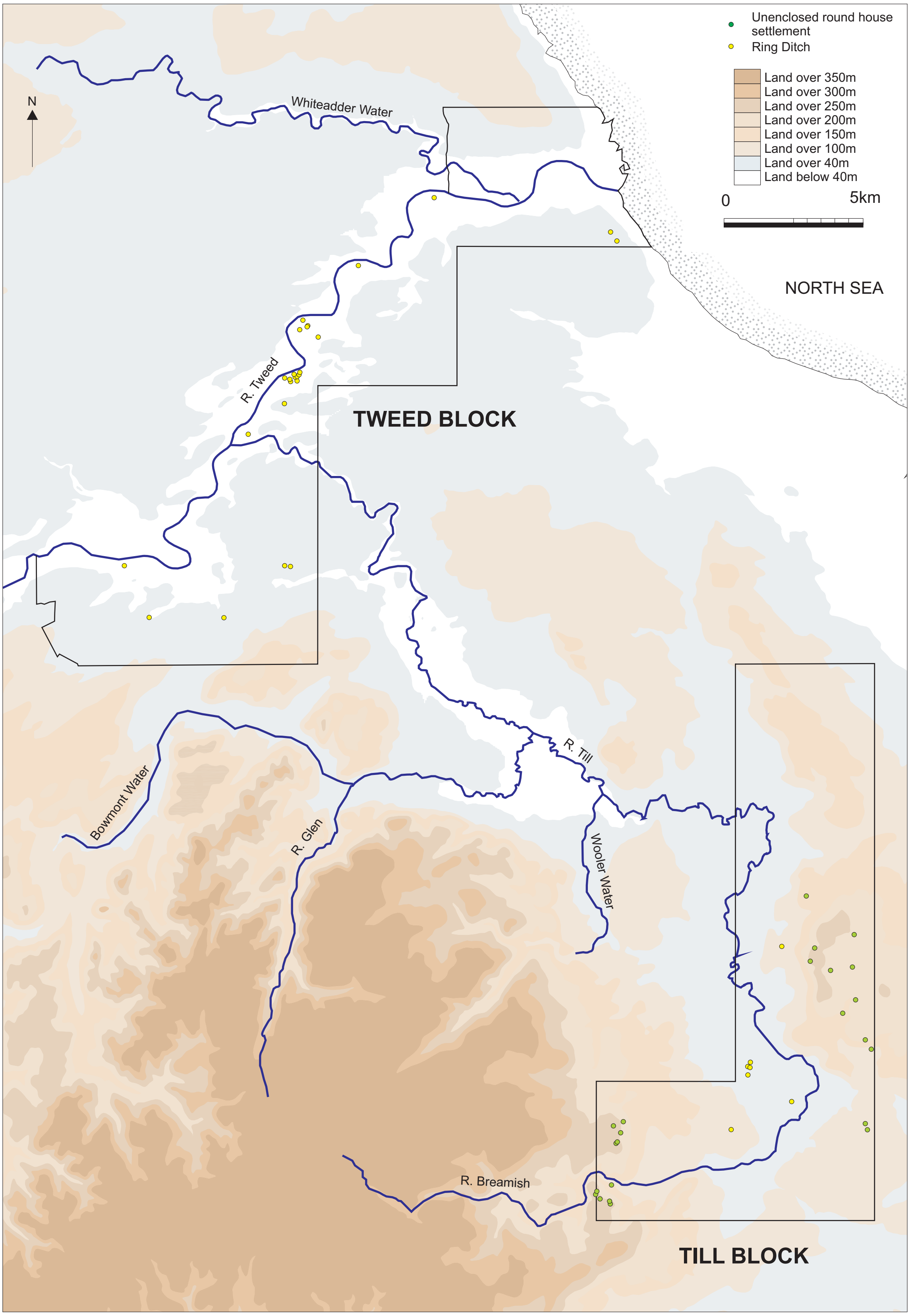


Fig. 4.10. Distribution of unenclosed settlements (earthworks) and ring ditches (cropmarks).

Fig. 4.11. Cropmarks showing a pit alignment and a settlement of unenclosed roundhouses at Low House West.

of palisaded settlements is better represented by that of Iron Age forts than it is by those palisades which, for whatever reason, were not replaced by settlements enclosed by stone walls or by earthen banks and ditches. Accordingly, the distribution maps of palisades presented here cannot be said to have more than limited validity.

Palisaded settlements range in size from simple homesteads up to large, complex sites with multiple perimeters. At Shoresdean (UID 4038; NT 9454 4585), for example, a single timber roundhouse is contained by a single line of palisade, *c*.30m in diameter, which encloses a circular area of only 0.05ha. At the opposite end of the scale is the site which crowns the summit of East Brandon Hill, 3km east-north-east of Ingram (UID 1381885; NU 0463 1804; Fig. 4.14). Here three, or more probably four, lines of palisade – not all of which can be contemporary – form an egg-shaped enclosure with an internal area of 0.62ha. In terms of its size, this particular settlement is therefore a good deal larger than many of the Iron Age forts that are to be found in this same region. This is also one of very few sites in the North-East of England that can be associated with a find of Bronze Age metalwork, for it was here, in June 1857, that three bronze swords of Late Bronze Age (Ewart Park) type were ploughed up 'near the summit of the hill' (Hardy 1886, 284). The precise findspot, as recorded by Henry MacLauchlan at or soon after the time of discovery, seems to have been very close to the southern perimeter of the palisaded settlement, as later revealed by air photography (MacLauchlan 1864, Sheet III). Given the extreme rarity of metalwork from settlement sites in the North-East generally it is especially unfortunate that a mobile phone mast has now been erected on the site.

What appears to be another palisaded settlement has been identified at Percy's Cross (UID 1378735; NU 0572 1953), 3km due north of Powburn. Here, a low knoll, raised only a few metres above the floodplain of the Breamish, is encircled by an oval ditch representing the perimeter of a univallate fort or defended settlement of Iron Age date. Within the ditch, two concentric lines of palisade are visible with opposed entrances in the east and west facing sides. In this instance a progression from timber-built settlement to later fort can reasonably be proposed. However there are other sites where

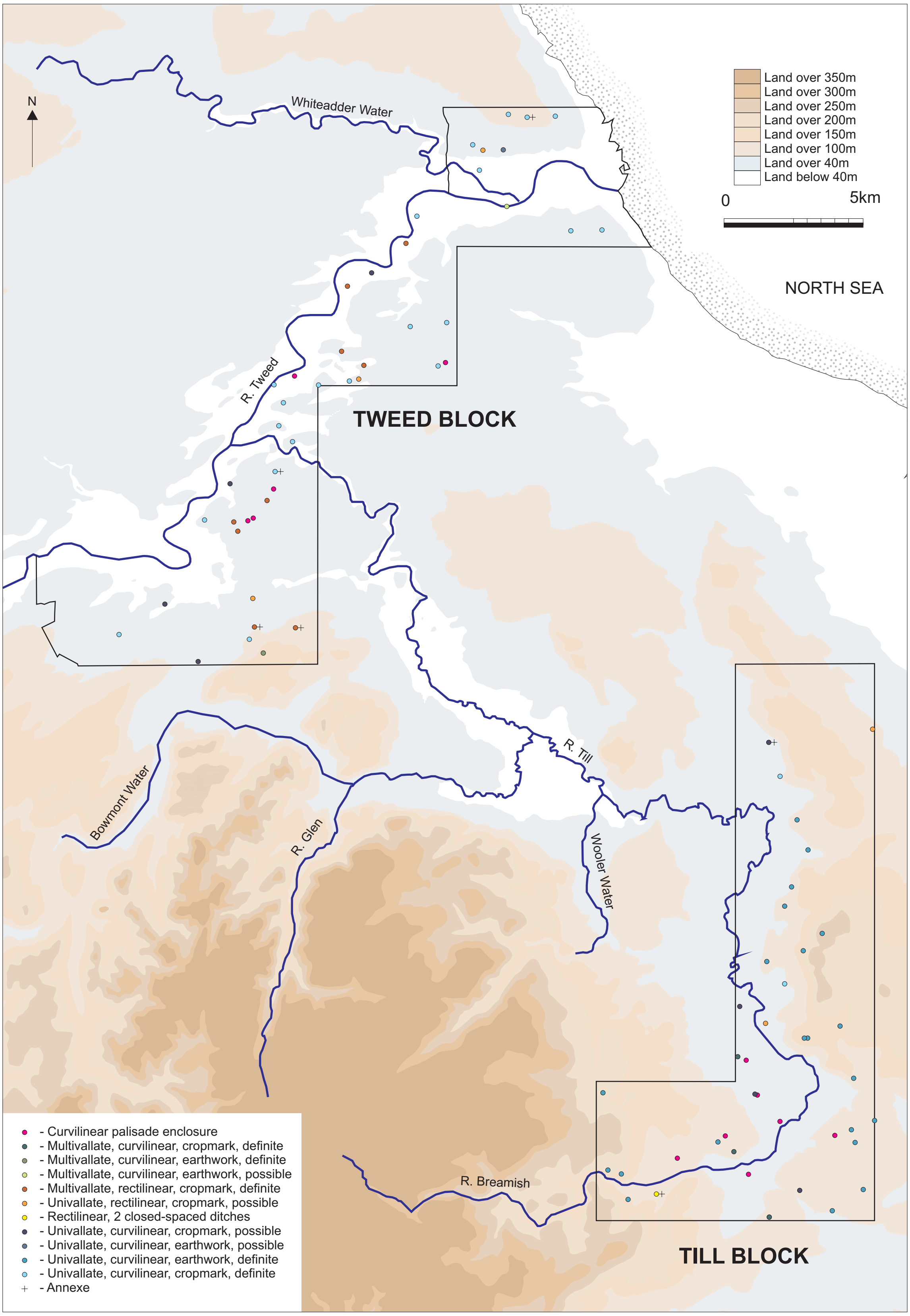


Fig. 4.12. Distribution of earlier Iron Age settlements (earthworks and cropmarks).

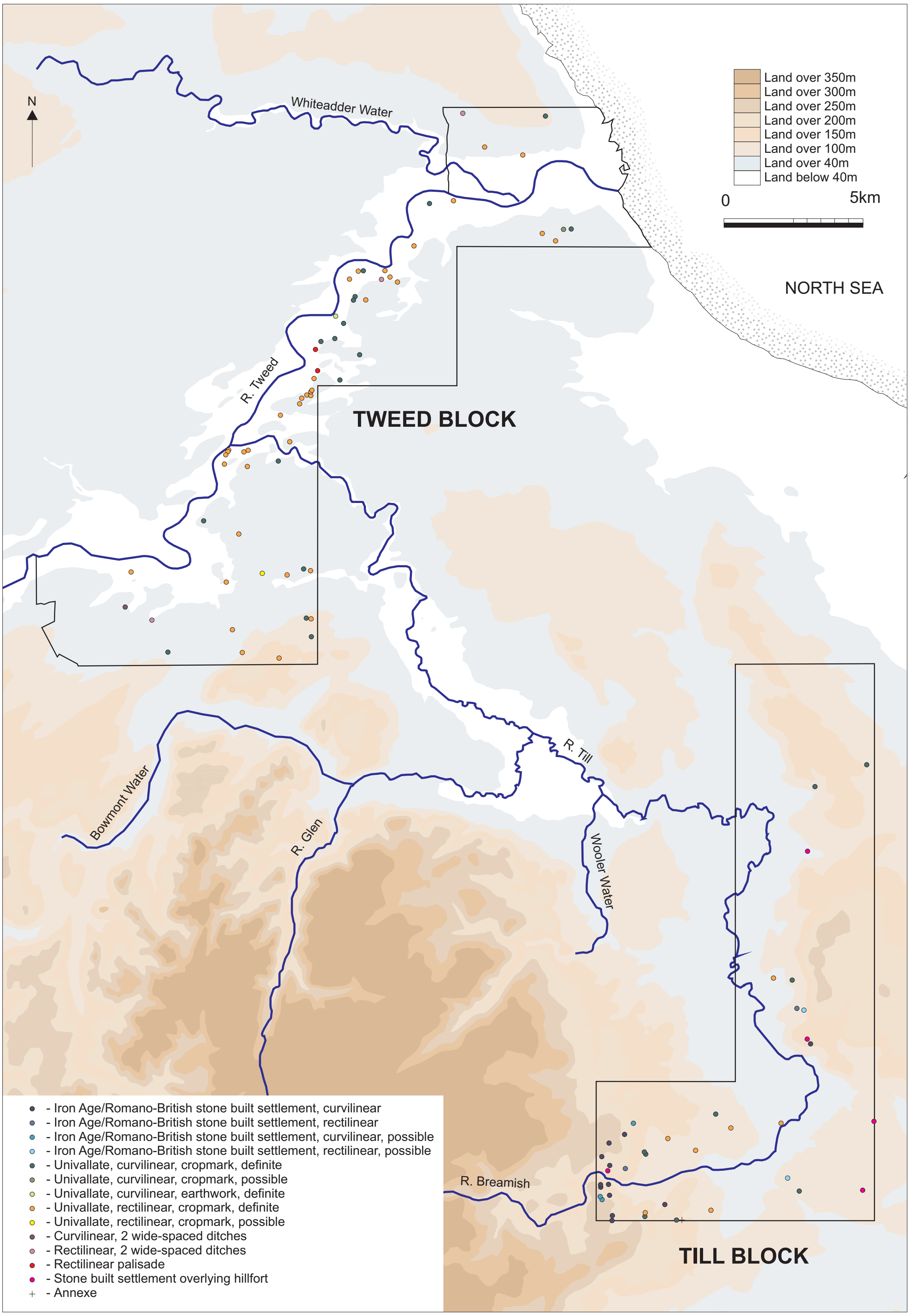


Fig. 4.13. Distribution of later Iron Age and Romano-British settlements (earthworks and cropmarks).

Fig. 4.14. A palisaded settlement on East Brandon Hill, Ingram, showing as a parchmark.

construction trenches are visible as cropmarks which, though indistinguishable from lines of palisade, seem more likely to represent either the timber revetment of an earth rampart or part of a box rampart.

At Hepburn Wood (UID 5768; NU 0676 2351), for example, a construction trench for upright timbers runs just inside and concentric with the innermost ditch. What is not clear, however, is whether the feature in question represents a free-standing palisade which predates the fort or, alternatively, part of a box-rampart or some other kind of timber reinforcement belonging to the fort rampart. This same ambiguity also applies at certain multivallate forts where putative lines of palisade have been identified as cropmarks between the ditches separating the now levelled ramparts.

At Groat Haugh (UID 1340336; NT 8846 4506; Fig. 4.15), for example, a cliff-edge fort is represented by four concentric, semi-circular ditches. Here a single palisade or construction trench neatly bisects the space between the outermost pair of ditches, while a pair of trenches similarly intervenes between the second and third ditches. All three construction trenches are so narrow that they can only have held timber uprights and, since they precisely follow slight irregularities in the corresponding ditches, there can be no doubt that in this instance they formed part of the same system of defences. Indeed, this is further demonstrated by arrangements at the entrance through the outer three ditches where the construction trenches join together, so forming what looks like a timber-lined passage-way through the ramparts. In these circumstances, the evidence in favour of some form of box rampart or timber revetment seems undeniable. The only

Fig. 4.15. A multivallate Iron Age fort at Groat Haugh, Norham, showing as a cropmark.

plausible alternative explanation might be that the two outer ramparts of the later fort had been built on exactly the same line as a pre-existing twin palisade of unusually complex design, and without the lapse of any significant interval of time, as has been shown to have happened at Huckhoe (Jobey 1968b).

Another site which deserves mention in this context is what seems most likely to be a palisaded enclosure at Groat Haugh East (UID 1383408; NT 8918 4537, Fig. 4.16). In this case, an almost circular enclosure, 68m in diameter, is defined by what is either a very narrow ditch or, more probably, the construction trench for a timber palisade. Presumably on account of its near-circular plan and the fact that it possesses opposed entrances in the north-west and south-east facing sides, this particular site has previously been considered as a possible Class II henge (Harding and Lee 1987, no. 125A). However, the trench marking the perimeter is very much narrower than would normally be expected of a ditch belonging to a henge and the existence of at least one, and more probably two, small ring ditches – of which at least one appears to be a (Bronze Age or perhaps later) burial monument – hard by the perimeter on the north-east and south-west sides, would appear to rule out the existence of an external bank such as would be expected in the case of a henge. The perimeter at Groat Haugh East resembles a palisade rather than a henge, and opposed entrances can also be found on several palisaded settlements in this region including, for example, sites at White Hill (RCAHMS 1967 inv. 207) and Blackbrough Hill (RCAHMS 1956, inv. no. 302). In-turned entrances, too, have been discovered in excavation at Braidwood, Midlothian (Piggott 1958) and are also in evidence to a lesser degree at Glenachan Rig (RCAHMS 1967, no. 197).

In addition to the curvilinear palisades described above, two rectilinear palisaded enclosures have come to light as cropmarks which it is appropriate to consider at this point (Appendix F). For, although visible evidence of interior houses is lacking, in size and shape these sites are comparable to other rectilinear palisades which were discovered in the 1970s during the excavation of a small number of Romano-British stone-built settlements in the North Tyne valley. Here, on five different settlements, the final re-building in stone was found to have been preceded by one, two or even three separate phases of timber building, involving the successive replacement of both houses and their enclosing palisades. At two sites, Kennel Hall Knowe and Belling Law, radiocarbon dates were obtained which showed that the earliest phases of timber building belonged to the late pre-Roman Iron Age (Jobey 1977; 1978). Now, thirty years later, about a dozen sites which are ostensibly similar in plan to those discovered in the North Tyne valley have been recorded as cropmarks at various locations in north Northumberland, including two near Norham which fall within the scope of this survey, and one at Flodden Hill overlooking the Milfield Basin which was partly excavated as part of this study (see below, Chapter 5).

Not included in this tally is another group of much less regular, and mostly smaller, fenced enclosures which repeatedly occur as component parts of complex settlement sites of known or suspected Anglo-Saxon date as, for example, at New Bewick (NU 061

Fig. 4.16. Cropmarks showing a probable palisaded enclosure at Groat Haugh East, Norham.

205; UID 5828 and 1380572) (Gates and O'Brien 1988). These settlements are discussed later.

Hillforts and related settlements

Hillforts are some of the most dramatic and evocative of the ancient monuments encountered in the Northumberland uplands, where they exist in large numbers as earthworks, especially on the fringes of high ground overlooking the valleys of the Till and its tributaries, the Glen and the Bowmont Water. Within the confines of the present survey there are several well known and spectacular hillforts including, for example, those at Old Bewick (Fig. 4.17), Beanley Rings and Ros Castle.

In Northumberland generally, one of the most important contributions of archaeological air photography over the past half century has been the discovery that Iron Age forts and defended settlements are by no means restricted to those upland areas where most of the better known sites are located (Jobey 1965). Within the present survey, 36 forts have so far come to light as cropmarks in lowland situations, in addition to the 24 which had previously been recorded as earthworks. Even this surprisingly high number is without doubt an underestimate because it does not include univallate (single-ditched) sites whose status as defended settlements cannot reliably be established on the basis of cropmark evidence alone. With this caveat in mind, one might cautiously identify as potential forts another 10 or 12 single-ditched enclosures (both curvilinear and rectilinear) recorded as cropmarks, either because they occupy defensive positions or stand out from the mass of other enclosures on account of their relatively large size (see below Table 4.3).

One consequence of the discovery of lowland forts

Multivallate curvilinear forts (cropmarks) ranked according to size Tweed block		
1384335	Prior House	0.12
138290	Grindon North	0.13
1385188	Twizell Smithy	0.14
4224	Camphill	0.17
4227	Halidon Hill	0.26
1383327	Shoreswood Loan	0.28
4037	Bleak Ridge	0.34
4310	Union Bridge	0.35
4025	Whidden Hill 1	0.37
1109	Castle Hill	0.42
1340336	Groat Haugh	0.43
1167	Pressen Hill	0.48
1384031	East Moneylaws West	0.48
4272	Whiteadder Bridge	0.48
1401	Cornhill	1.38
Multivallate curvilinear forts (cropmarks) ranked according to size Till block		
1381932	Brandon Hill Head	0.12
1378754	Hemmel House	0.14
1380527	Wooperton East	0.32
1382586	Old Lyham	0.40
Multivallate curvilinear forts (earthworks) ranked according to size Till block		
5438	Chilligham Park	0.13
5753	Blawearie	0.15
4833	Beanley Ringses	0.16
5452	Chatton Park	0.17
4838	Beanley Plantation	0.18
4878	Titlington Mount	0.21
5465	Carls Walls	0.38
5768	Hepburn Wood	0.39
5743	Old Bewick West	0.39
5473	Old Bewick East	0.40
Multivallate rectilinear forts (cropmarks) ranked according to size Tweed		
4045	Greenhill 1	0.21
1385175	Melkington	0.24
1134	Cramondhill 1	0.26
4041	East Newbiggin	0.33
4036	Battle Moor	0.34
1383741	Cramondhill North	0.44
1122	Branxton Hill South	0.67
1127	East Moneylaws North	0.70
Multivallate rectilinear forts (cropmarks) ranked according to size Till		
1034524	Ingram South	0.27

Table 4.2. Iron Age forts ranked by size (in hectares).

in such numbers is a rebalancing of the distribution pattern away from the uplands towards the major river valleys and, to a lesser extent, the coastal plain (Figs 4.12 and 4.13). So far as this survey is concerned, we can now see that there are noticeable concentrations of forts in the Till valley and the more spacious landscape of the lower Tweed. This thickening of the distribution pattern on lower ground further emphasises the almost complete absence of sites from the high interior of the Fell Sandstone moors which rise between the Till valley and the sea. Here, hillforts and defended settlements are restricted to strategic positions on the edge of the escarpment, with commanding views of the Breamish and Till valleys to the west and the coastal plain to the east. As has already been mentioned, this void in the distribution pattern may reflect the effects of a wetter climate which, since the Late Bronze Age, is likely to have rendered these inherently fragile soils progressively infertile and so less attractive for arable cultivation.

On better preserved forts that have not been re-occupied by later, stone-built settlements, it may

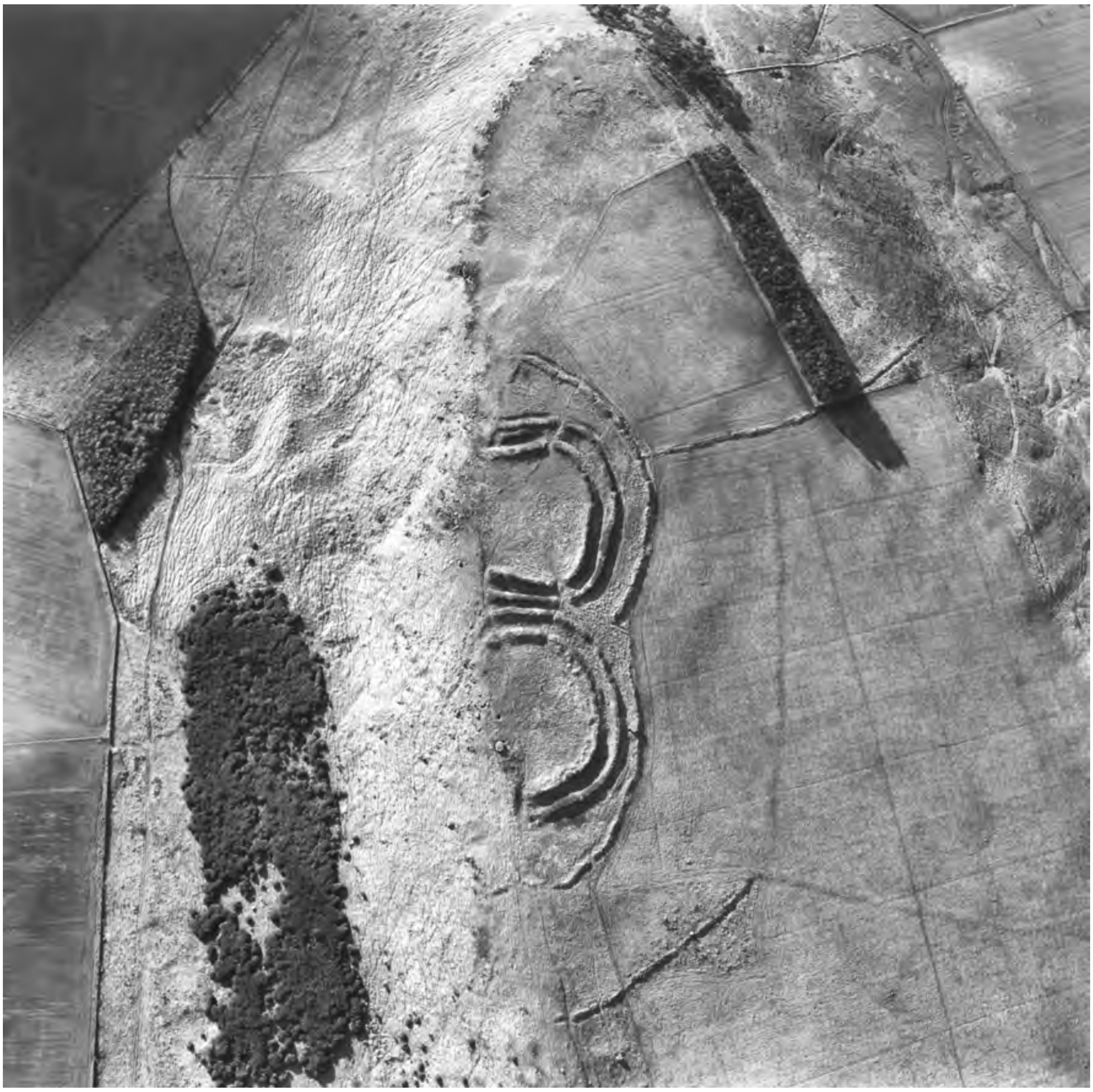


Fig. 4.17. Earthwork remains of two multivallate Iron Age forts situated sided by side on the edge of a steep, west-facing slope (left of frame). The linear boundaries to the east are of much later date.

sometimes be possible to detect signs of timber roundhouses in the interior, either in the form of semi-circular platforms cut into sloping ground or as faint traces of foundation trenches for houses of 'ring groove' or 'ring ditch' construction. On plough-levelled sites, cropmarks indicating the positions of roundhouses are sometimes visible as disc-shaped marks of solid tone or, less frequently, as ring ditches. Cropmark forts where timber roundhouses can be identified include, for example, those at Branxton Hill South (UID 1122; NT 8921 3631. Fig. 4.18), Cramondhill 1 (UID 134; NT 8716 3979) and Grindon North (UID 138290; NT 9113 4520).

In this area, hillfort defences consist either of earth banks accompanied by ditches or else massively built stone walls, the choice invariably being determined by the presence or absence of solid rock outcropping at the surface. The survey territory contains two stone-walled enclosures, at East Reaveley (UID 5043; NU 0090 1668) and Ewe Hill (UID 5050; NU 0042 1682), which may have originated as univallate hillforts but which are now too badly mutilated for secure classification. Forts defended by a single rampart and ditch are, on the other hand, relatively common and at least ten extant examples are listed here (Appendix F). Amongst these are some unusually large sites.

Multivallate forts occur both as earthworks and cropmarks and are relatively more numerous than their univallate counterparts (Appendix F). However, as mentioned above, a problem arises in the case of univallate forts because it is usually not possible to distinguish single-ditched enclosures which are defensive in character from those which are not solely on the basis of cropmark evidence. By contrast, multiple-

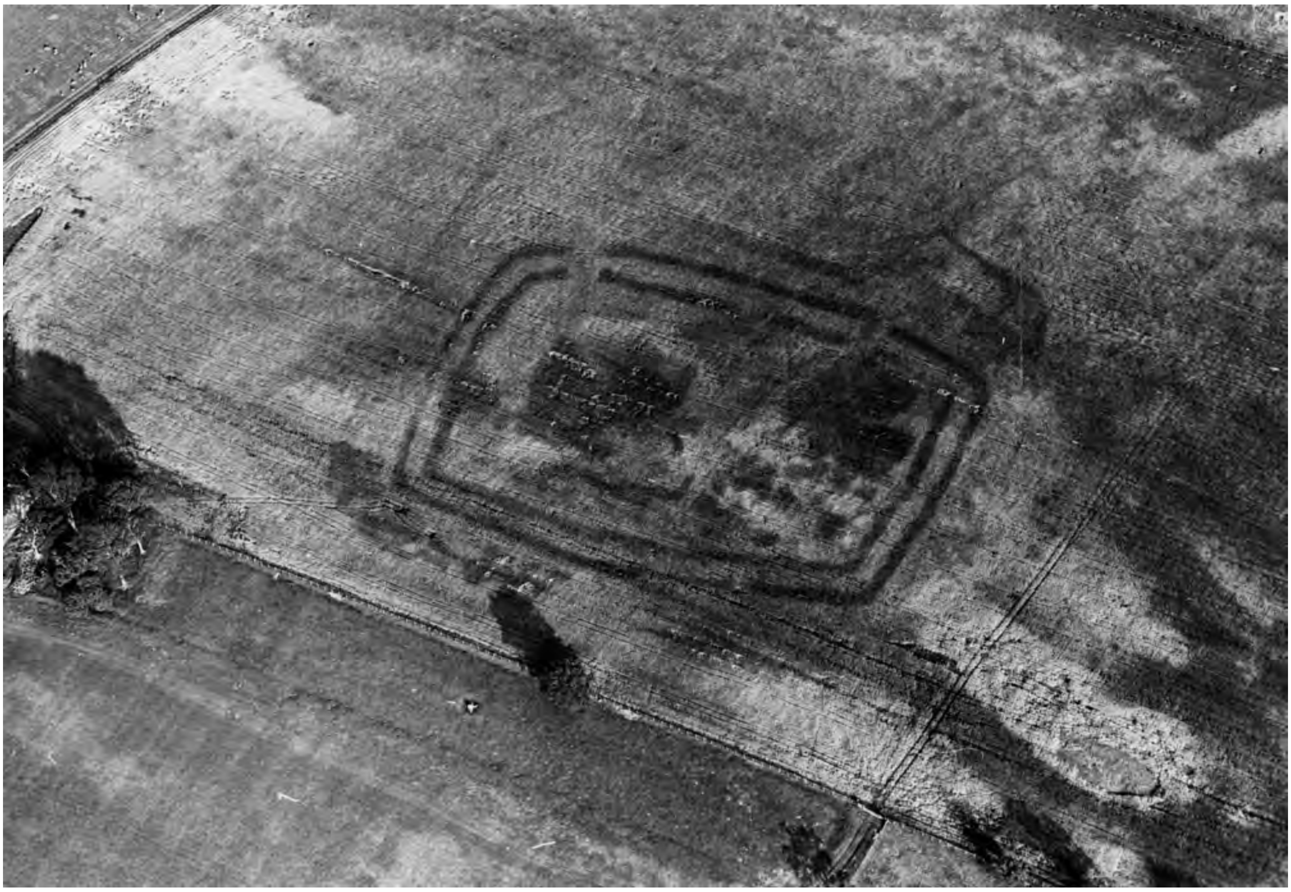


Fig. 4.18. A bivallate Iron Age fort showing as a cropmark at Branxton Hill South, Branxton.

Tweed survey block	UID	Grid reference	Area (ha)	Form
Hagg Crossing	1121	NT 8576 3510	0.45	Curvilinear
SE Baldersburyhill 2	4273	NT 9587 5351	0.45	Rectilinear
Lightpipehall	1382486	NT 8458 3717	> 0.35	Curvilinear
Battle Moor South	1383298	NT 9146 4526	0.55	Rectilinear
Donaldson's Lodge	1383738	NT 8689 4150	*c*.1.4?	Curvilinear
Marl Bog	1384009	NT 8769 3737	0.91	Sub-rectangular
Till survey block				
Derry Dykes	6166	NU 0991 3265	0.47	Rectilinear
Bewick Bridge West	610162	NU 0515 2270	0.36	Curvilinear
Percy's Cross	1378735	NU 0572 1953	0.68	Curvilinear
Crawley Dean	1378762	NU 07301609	0.34	Curvilinear
Bewick Bridge East	1380492	NU 0607 2209	0.84	Rectilinear
North Lyham	1382576	NU 0619 3218	0.41	Curvilinear

Table 4.3. Cropmarked single-ditched enclosures of relatively large size some of which may represent univallate Iron Age forts.

ditched sites are more readily identified as cropmarks because the close spacing between the ditches usually leaves little doubt as to their defensive nature, bearing in mind that not all the ditches were necessarily in contemporary use.

As mentioned above, the survey territory contains roughly a dozen single-ditched enclosures that have been recorded as cropmarks and stand out either on account of their relatively large size or because they occupy prominent and defensible positions (Table 4.3). While neither of these characteristics can in themselves offer a sufficient basis on which to determine the nature or context of these sites, it nevertheless seems likely that some represent univallate Iron Age forts.

The hillforts of Northumberland and the adjacent

Borders region are remarkably varied so far as their plans are concerned, reflecting a high level of adaptation to individual topographical settings (RCAHMS 1956; Jobey 1965). While the vast majority of upland sites, both univallate and multivallate, are curvilinear in form, with defences which follow the rounded contours of the hills, there are two multivallate earthworks in Northumberland, at Manside Cross and Ewesley Fell, which are rectilinear on plan (Jobey 1965). By contrast, as air photographs now show, the proportion of multivallate rectilinear forts is much greater on lower lying ground, particularly on the English side of the Tweed and southwards down the coastal plain as far as the Tyne. South of the watershed between the rivers Aln and Coquet, however, the density of forts becomes noticeably thinner and barely a couple of dozen cropmark sites of any kind can presently be identified on the coastal plain between the Wansbeck and the Tyne. Here, though, some allowance should be made for the destructive effects of opencast coal mining and urban expansion.

Returning now to the area covered by the present survey, 49 forts have been identified and are documented, with varying degrees of confidence, in the accompanying lists (Appendix F). Interestingly, no fewer than 36 of these sites (74%) are multivallate cropmark sites of which 10 are rectilinear on plan and the rest curvilinear. While these figures reveal a much higher density of forts than could have been foreseen even as recently as twenty years ago, especially in the lower Tweed Basin, the resulting lists should not be thought of as an unbiased sample of sites in this category. For, as previously explained, they take no account of any *single-ditched* cropmarks, at least some of which will undoubtedly also represent Iron Age forts or defended settlements. Be that as it may, a much larger number of Iron Age forts and defended settlements can now be shown to exist in low-lying parts of the Tweed and Till valleys than has previously been supposed, with all that this implies in terms of population density and territorial organisation.

Regarding their defences, cropmark multivallate forts may possess two, three or even four ditches. Where they are strictly concentric, the ditches are usually separated by intervals of around 6m to 10m and it can reasonably be assumed that in most cases this space was largely, if not wholly, taken up by a rampart of commensurate width. On the other hand, in situations where ditches diverge or are more widely spaced, a berm of some kind may be envisaged. One such example would be the triple-ditched fort at Old Lyham (UID 1382586; NU 0660 3096), where, on the north side of the fort, the separation between the two outer ditches is as much as 25m and therefore significantly greater than could be accounted for by a single rampart. Here, just as has been suggested in the case of Blawearie (UID 5753; NU 0875 2199), where a comparable situation exists (Jobey 1965, Fig. 13), the intervening space could have been used as a corral for stock or, less likely perhaps, for growing crops.

In the area under review, forts with three or more lines of defence are relatively scarce and only two sites possessing four ramparts or ditches have so far been recorded, whether as earthworks or cropmarks. The first of these, at Carls Walls (UID 5465; NU 0760 2832), is situated on low-lying ground close to a stream and is now so ploughed down as to be barely traceable as a field monument. The second, at Groat Haugh (UID 1340336; NT 8846 4506. Fig. 4.15), occupies a cliff edge position with commanding views over the River Tweed. In this case, as the four ditches are strictly concentric and spaced more or less the same distance apart, this suggests they may originally have been conceived as a unified system of defence. As noted above, the ramparts may have been preceded by twin lines of palisade. Alternatively, the foundation trenches that are visible on the air photographs could have held timbers for a box rampart.

Where hillforts survive in a good state of preservation, it is by no means unusual for there to be evidence of later settlement in the form of stone-built roundhouses and yards which, as they frequently overlie the hillfort ramparts or spill out beyond them, must be attributed to a period after the defences had gone out of use or had become redundant. Whereas in the past this phenomenon has usually been seen as evidence of the *pax Romana*, there is at least a theoretical possibility that some stone-built settlements could have origins in the pre-Roman Iron Age. Indeed, the excavation on a late prehistoric settlement at Fawdon Dean has produced radiocarbon dates in the Late Iron Age for stone-built roundhouses contained within a ditched or palisaded enclosure (Frodsham and Waddington 2004). As no other dates as early as this have yet been obtained from other stone-built roundhouses in the region, there is presently no way of knowing how widespread this phenomenon may be; given the chronological insensitivity of native artefacts, the question is one which is only likely to be resolved by further excavation and radiocarbon dating. Meanwhile, field surveys recently carried out by English Heritage on fifteen hillforts in the Northumberland National Park have shown that no fewer than nine were overlain by stone-built settlements of considerable complexity, which themselves may represent several different phases of occupation (Oswald, Ainsworth and Pearson 2006). On the most complex sites, it remains to be seen whether all these phases of stone-building can be accommodated within the three centuries which span the Roman occupation in the North.

The visible remains of stone-built roundhouses and their attendant yards and enclosures can be seen superimposed over earlier hillforts at several sites in the study area including Beanley Rings (UID 4833;

Fig. 4.19. Norham Castle and surrounding earthworks including part of the rampart thought to have been a possible Iron Age fort, but which has subsequently been demonstrated to be of post-medieval date.

NU 0999 1860), Titlington Mount (UID 4878; NU 0958 1612), Chattonpark (UID 5452; NU 0721 2940), Old Bewick West (UID 5743; NU 0747 2156. Fig. 4.17) and Ewe Hill (UID 5050; NU 0042 1682), though the status of this last site as a hillfort is uncertain.

Where lowland forts have been recorded as cropmarks, it is not possible to tell from air photographs whether or not there has been later, Romano-British, occupation of the type described even if, as we may suspect, a proportion of these sites was occupied in the Roman period as some of their upland counterparts so evidently were. On the other hand, excavations undertaken at Murton High Crags, in the lower Tweed valley, have shown a late Iron Age palisaded enclosure containing timber roundhouses was eventually superseded by a stone-built settlement of the Roman period of which there was no visible sign on the air photographs that were available beforehand. In this instance, all of the nine or ten stone-built roundhouses that were discovered had been so severely damaged by stone-robbing and ploughing that they were represented by nothing more than remnants of stone paving and occasional arcs of wall (Jobey and Jobey 1987). In the case of unexcavated lowland forts, our inability to identify similar phases of Romano-British occupation by means of air photography cannot therefore be taken as evidence that later settlement was lacking.

In considering the possibility that at least a proportion of lowland forts continued to be occupied into the Roman period, it is useful to note a number of instances where external annexes show up as cropmarks. Thus, in the territory under review, there are at least half a dozen sites where air photography has shown that annexes are present including Stickle Heaton (UID 1397; NT 8849 4194), Camphill (UID

Fig. 4.20. A multivallate Iron Age fort and annexe showing as a cropmark at Camphill, Berwick.

4224; NT 9745 5470; Fig. 4.20), North Lyham (UID 1382576; NU 0619 3218), Branxton Hill South (UID 1122; NT 8921 3631; Fig. 4.18), East Moneylaws North (UID 1127; NT 8775 3634) and Ingram South (UID 1034524; NU 0215 1596; Fig. 4.21). In most if not all of these cases, the annexe, which may be defined either by a single ditch and bank or else by a line of palisade, appears to have been of relatively slight stature compared with the hillfort defences themselves. If this was indeed the case, it may mean that annexes were added at a relatively late stage in the lifetime of these forts, possibly long after they had ceased to serve any defensive function. On this point it may be relevant to cite a date of 1840±40bp (ASUD 1997, 6), which calibrates to AD 70–AD 250 at the 95% confidence level, obtained on a sample of charred grain from the fill of a ditch at Ingram South (UID 1034524; NU 0215 1596), a settlement defined by two close-set ditches to which one if not two annexes are attached. Occupation of the site during the Roman period seems therefore very likely.

At four cropmark sites it has been possible to measure both the internal area of the original enclosure and that of the accompanying annexe and the results are presented in Table 4.4.

With the exception of North Lyham, all the sites listed above are forts or defended settlements that are defined by at least two close-set ditches. Although North Lyham is a single-ditched enclosure, it is included here on the speculative assumption that it too may be a defended settlement of the Iron Age (see discussion above). As stated in the introduction, the figures given are for the area contained within the ditches (or, in the case of multivallate forts, the inner ditch) and thus take no account of the area occupied by the innermost rampart. Accordingly,

Fig. 4.21. An Iron age fort or defended settlement and annexe at Ingram South showing as a parchmark.

Site	UID	Area of fort contained within the innermost ditch	Area of annexe (ha)
Stickle Heaton	1397	0.3–0.4 ha(?)	0.3
Camphill	4224	0.17	0.4
North Lyham	1382576	0.41	0.44
Ingram South	1034524	0.27	0.37 + second annexe?

Table 4.4. Comparative size of forts and annexes.

these measurements, while valid for purposes of comparison, would have to be reduced, in some cases by as much as 30% or more, to give an idea of the space that would actually have been available for habitation. What, however, is clear is that the effect of adding an annexe would in every case have been to double or even triple the amount of enclosed space.

Given the uncertain nature of cropmark evidence, we cannot know for sure how many lowland forts did in fact possess annexes of the type described, but present indications are that the proportion is small and may even be as low as 15%. What this means is unclear, but it begins to look as if forts with annexes may constitute a functionally or chronologically distinct type of monument.

While it is possible to envisage a range of different functions for annexes attached to forts, it is likely that they were intended primarily as enclosures for stock and/or to provide additional space for human habitation. Indeed these two functions need not be mutually exclusive and the existence of what seem to be at least two (timber ?) roundhouses situated within the annexe at Camphill (Fig. 4.20) is of particular interest, though without excavation it is impossible to be certain whether these were domestic dwellings, barns or agricultural buildings of some other kind.

In considering the context and function of annexes attached to lowland forts, we can usefully consider the situation as revealed by recent field survey at two hillforts in the north Cheviots, West Hill and St Gregory's Hill, both of which were included in the Northumberland National Park's 'Discovering Our Hillfort Heritage' project (Oswald *et al.* 2006).

At West Hill (NT 910 295), a low earth and rubble bank encircles the fort at a distance of 12–35m from the rampart, enclosing an area of some 0.74 ha exclusive of the space occupied by the fort itself. While the date of construction of this outer wall has not been established precisely, it was certainly added some time after the fort perimeter had fallen into disrepair. Also, given its low stature, it is clear that it cannot have had a defensive purpose. Rather, it can best be interpreted as a stock enclosure or corral added to the site as part of a general redevelopment which took place in the late pre-Roman Iron Age or the Early Roman period and is also represented by the first appearance of a succession of round stone-founded houses. These later settlements are in turn associated with a well-developed system of walled trackways and fields, some of which contain lynchets, suggesting perhaps that they have been used to grow crops at some stage in their existence. Either way, it seems very likely that a mixed farming economy was being pursued by the inhabitants of these stone-built settlements and that the trackways, which pass between the fields without linking them together, were used to move stock back and forth between the putative stock enclosure and unenclosed pasture lying beyond the fields.

A broadly similar situation exists at St Gregory's Hill (NT 916 298). Here again, what can best be accounted for as a livestock enclosure or corral was tacked onto the east side of the hillfort some time after the defences had fallen into disuse. As at West Hill, the corral is associated with a settlement of stone roundhouses, fields and a trackway and forms one element in a complex of earthworks which can again be attributed to the late pre-Roman Iron Age or to the Roman period, when the hillfort had already ceased to function as a defensive site.

If, as we may suppose, West Hill and St Gregory's Hill are the upland counterparts of the multivallate cropmark forts we have been discussing, it is reasonable to see the 'annexes' identified on air photographs as the lowland equivalent of the 'corrals' which have been recorded by field survey on these better preserved sites in the uplands. In this event, they too might represent a relatively late development introduced as part of the transition to what are essentially non-defensive forms of settlement accompanied at the same time by organised field systems, perhaps indicating an increased role for arable agriculture in the farming economy. So far as cropmark sites are concerned, there are indeed some multivallate sites within the survey area where traces of field systems seem to be present though it is difficult to tell whether these originated in the Iron Age or, more probably, were added during the Roman period, as appears to have been the case at West Hill and St Gregory's Hill.

In Northumberland, the most extensive field system attributable to the pre-Roman Iron Age or Roman periods that has so far been identified in the form of cropmarks lies immediately adjacent to the bivallate rectilinear fort at Branxton Hill South (UID 1122; NT 8921 3631; Figs 4.22 and 4.23). Here, on gently undulating ground to the south of the fort, a series of rectilinear fields or paddocks has been formed by a combination of ditches and pit alignments. Where they can be measured, these fields or enclosures appear to be relatively large, each containing an area of not less than 2.0 ha. Without begging the question of their precise context, this would put them near the upper size limit of fields that have been documented in surveys of fields associated with Romano-British settlements elsewhere in the Northumberland uplands (Gates 1982).

To the east of the field system at Branxton Hill South, a linear ditch can be traced intermittently over a distance of 0.7km and could perhaps be seen either as a boundary separating the fields from possible unenclosed land beyond or perhaps from land belonging to a different social group. Comparable boundaries exist in reasonably close proximity to three other multivallate forts in the survey area, namely Cornhill (UID 1401; NT 860 404; Fig. 4.24), Cramondhill North (UID 1383741; NT 8702 4012) and Bleak Ridge (UID 4037; 9429 4574; Fig. 4.25). In the case of Bleak Ridge, the fort is partially encircled by a curving ditch, more than a kilometre long, which can be traced through an arc of almost 270 degrees at a distance of 150m to 350m from the fort. Assuming that it is indeed contemporary with the fort, it is more likely that this ditch represents a territorial boundary (or 'head dyke') rather than a single very large field.

Single-ditched enclosures

In assessing the possibilities for late prehistoric and Romano-British settlement in cultivated parts of the survey area, undoubtedly the greatest potential is that offered by the 80 plus single-ditched enclosures, whether curvilinear (Fig. 4.26) or rectilinear (Fig. 4.27), which are documented as cropmarks in the

Fig. 4.22. Cropmarks of a field system adjacent to the Iron Age fort at Branxton Hill South, Branxton. Note that the long, curving cropmark, running diagonally across the field and into the field corner at the bottom left of the frame, represents a modern water pipe.

accompanying lists (Appendix F). While some of these may represent univallate defended settlements of the Iron Age (see above), it is more than likely that the great majority can be accounted for as non-defensive settlements of the late pre-Roman Iron Age or Roman periods. Collectively, these sites represent 25% of the 350 or so cropmark sites of similar form that are currently on record in Northumberland as a whole.

At present, no sites in this category have yet been excavated within the sample territory. Accordingly, so far as context is concerned, we can do no more than extrapolate on the basis of what has been discovered about morphologically similar sites elsewhere in the region, with all the uncertainties that this entails.

As even a cursory glance at the aerial photographs will show, single-ditched enclosures come in a wide variety of shapes and sizes. Although it has been customary to divide the class as a whole into curvilinear and rectilinear types, it has long been acknowledged that such distinctions have at best only limited validity for dating purposes. And while a rectilinear plan was once seen as a likely indicator of a Roman context it was certainly no guarantee, as Jobey emphasised in his report on excavations at Doubstead near Berwick (Jobey 1982). Indeed, whether rectilinear or curvilinear, it may well be that local topography has in many instances played the dominant role in influencing the plan of these enclosures, curvilinear shapes being the norm on undulating ground, with rectilinear forms predominating where the terrain is relatively flat.

In the case of enclosures possessing at least one entrance and visible remains of interior roundhouses,

Fig. 4.23. Plan of field system at Branxton Hill South. Enlarged from 1:10,000 scale plot.

Single-ditched curvilinear enclosures (cropmarks) ranked according to size **Tweed**			
1384335	Prior House 2	0.08	
1384402	Prior Hill W ?	0.08?	Doubtful
4309	West Loanend	0.10	
1383282	Watch Law 2	0.11	
4042	West Burn 1	0.12	
4051	Norham West Mains 2	0.12	
1383282	Watch Law 1	0.12	
1385183	Buckie House West	0.13	
1401	Cornhill	0.18	
1384039	Branxtonmoor 2	0.18	
1384384	Loanend E	0.18	
1130	Branxton Hill East	0.26	
4044	Green Hill 3	0.27	
4051	Norham West Mains 1	0.27	
1382486	Lightpipehall	> 0.35?	Defensive?
4233	White Damhead Burn	0.4 ?	Defensive?
1121	Hagg Crossing	0.45	Defensive?
1383738	Donaldson's Lodge	1.4 ?	Defensive?
Single-ditched curvilinear enclosures (cropmarks) ranked according to size **Till block**			
6182	Northmoor	0.04	
1381892	Fawdon Dean 1	0.10	
6169	South Lyham	0.13	
1381909	Fawdon Burn	0.34	
1378762	Crawley Dean	0.34	Defensive?
610162	Bewick Bridge N	0.36	Defensive?
1382576	North Lyham	0.41	Defensive?
1378735	Percy's Cross	0.68	Defensive?
Single-ditched rectilinear enclosures (cropmarks) ranked according to size **Tweed block**			
1128	Tithe Hill	0.10	
1383311	Norham East Mains	0.11	
1384015	Branxton Moor 1	0.12	
4046	Greenhill 2	0.14	
1385207	Wideopen Plantation 2	0.14	
1385207	Wideopen Plantation 4	0.14	
1385207	Wideopen Plantation 3	0.15	
1384002	Pallinsburn House S	0.16	
1403	West St Cuthbert's	0.16	
1406	East St Cuthbert's 1	0.16	
1385207	Wideopen Plantation 1	0.16	
1385201	Shellacres	0.17	
1126	English Strother	0.18	
1406	East St Cuthbert's 2	0.18	
1384305	Ord Mains SE	0.19	
1125	Moneylaws Covert	0.20	
1401	Cornhill	0.20	
1403	Chapel Stream 1	0.20	
1403	Chapel Stream 2	0.22	
1382432	Brown Rigg 1	0.22	
4043	NW Norham East Mains 1	0.25	
1383998	Crookham Westfield	0.25	
4273	SE Baldersburyhill 1	0.26	
1134	Cramond Hill 2	0.26	
1157	Wark East	0.27	
1383314	NW Norham East Mains 3	0.27	
4047	Greenhill 4	0.32	
4048	East Norham West Mains	0.32	
1384299	High Letham	0.34	
1376	Haly Chesters	0.37	
1385207	Tillmouth Farm East	0.42	
4273	SE Baldersburyhill 2	0.45	Defensive?
1383298	Battle Moor South	0.55 ?	Defensive?
1384009	Marl Bog	0.91	Defensive?
Single-ditched rectilinear enclosures (cropmarks) ranked according to size **Till block**			
138176	Brandon Hill NE	0.10	
1381906	Heddon North	0.13	
5204	Whitridge Knowe	0.18	
1378750	Gallow Law	0.27	
1381892	Fawdon Dean 2	0.28	
6166	Derry Dykes	0.47	
1380492	Bewick Bridge East	0.84	

Table 4.5. Single-ditched enclosures ranked according to size (in hectares).

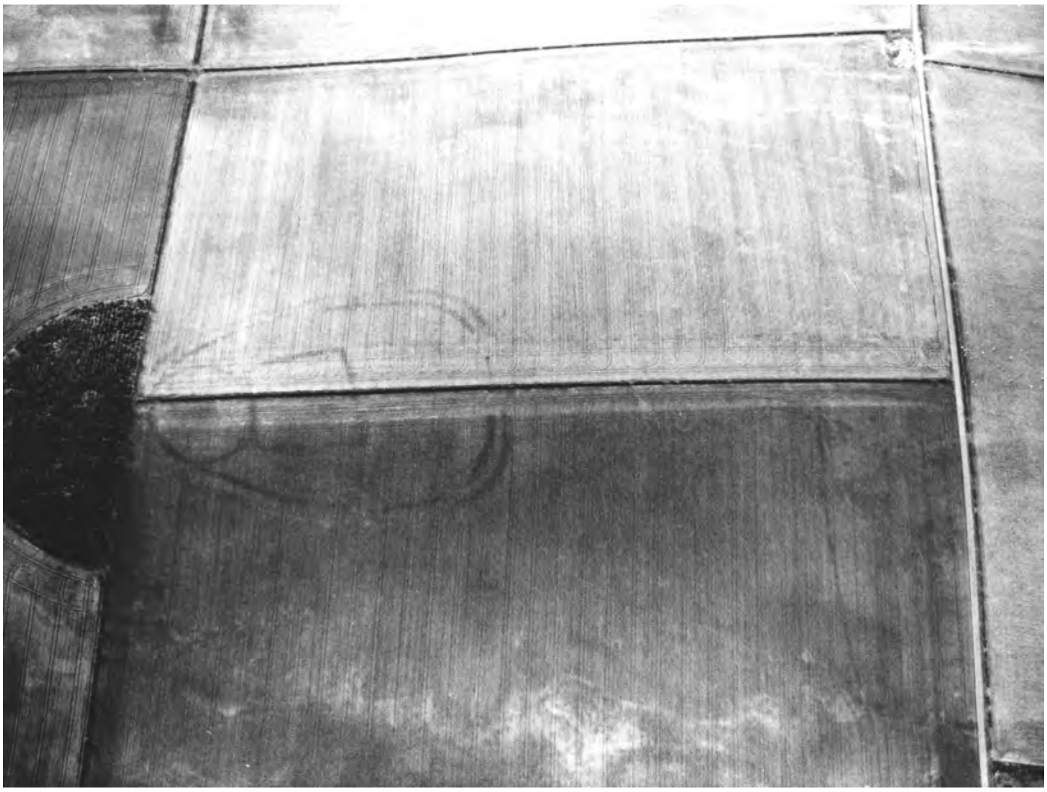


Fig. 4.24. Cropmarks show an Iron Age fort and secondary enclosures near Cornhill-on-Tweed. Towards the right of the frame, a linear ditch may represent a territorial boundary associated with the site at some stage in its existence.

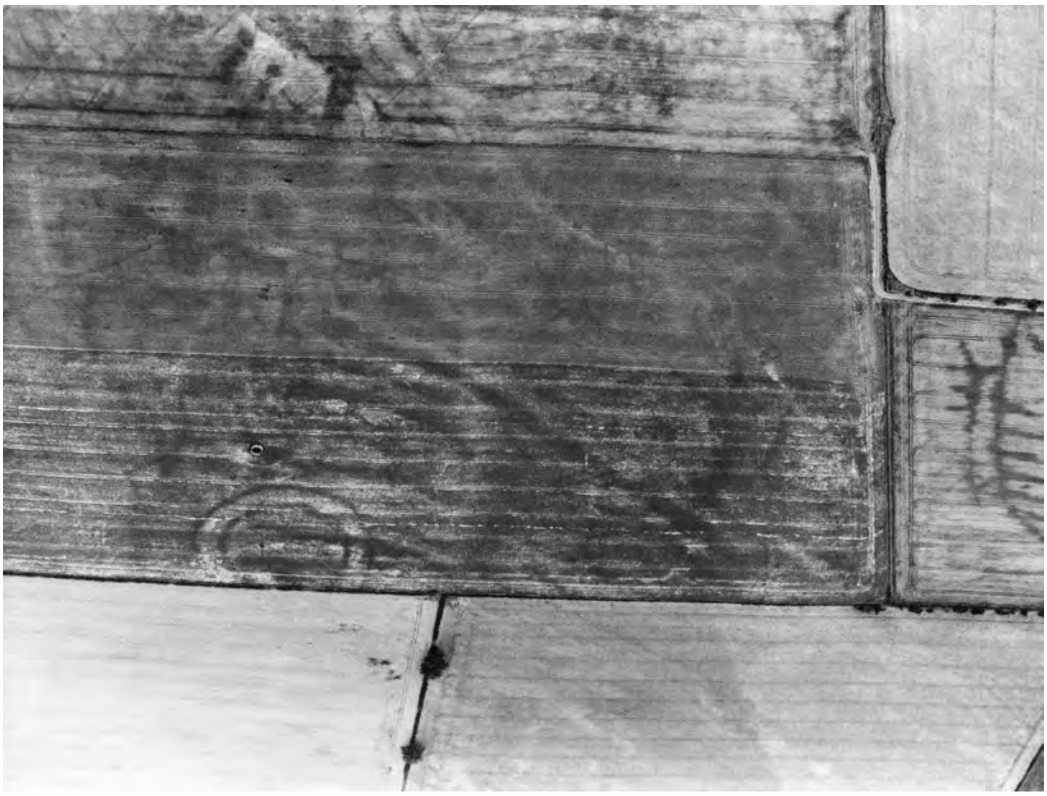


Fig. 4.25. Cropmarks of a bivallate Iron Age fort at Bleak Ridge, Shoreswood. In the same field, a long, curving ditch may represent a contemporary boundary.

Fig. 4.26. Cropmarks showing part of a single-ditched, curvilinear enclosure with an annexe attached to the NE side. Part of the site is obscured by an unresponsive crop.

Fig. 4.27. Cropmarks reveal a rectilinear, single-ditched enclosure with an entrance in the middle of the SE-facing side. The site is located on the S bank of the River Tweed.

their identity as settlements of one kind or another is pretty well assured. On the other hand, not all single-ditched enclosures can be explained in this way and on account of their small size there are several sites for which some other explanation must be sought. There is, for example, one enclosure, at West Ord 1 (UID 4278; NT 9519 5163) which measures only about 20m^2 and might qualify as a square barrow. Again, there is a small sub-rectangular enclosure on Lamb Knowe (UID 1382637; NT 8323 3795), which measures *c*.28m by 18m and which does not seem to have been a settlement, though it is not clear what else it might be. Equally, however, there are some enclosures with dimensions not much larger than this which do indeed seem to be genuine settlements, including, for example, a site at Whidden Hill 2 (UID 1338; NT 8987 4526). Here a sub-rectangular ditched or palisaded enclosure, with internal dimensions of 30m by 30m and an entrance in the centre of the south-west facing side, contains what is almost certainly the foundation trench for a circular timber building. At the other extreme, there are, as we have seen, enclosures such as Marl Bog (UID 1384009; NT 8769 3737; Fig. 4.28) or Bewick Bridge East (UID 1380492; NU 0607 2209), which are significantly larger than the general run of single-ditched enclosures and could represent settlements of a different order, though this is a matter which is unlikely to be resolved except by resort to excavation.

So far as cropmarks are concerned, perhaps the most familiar type of single-ditched enclosure is rectilinear on plan with an internal area in the range 0.1–0.3 ha and, more often than not, an entrance in the centre of the east-facing side. Enclosures of this order would appear to be the lowland equivalent of settlements that are well attested in the form of extant earthworks in the southern and western dales of Northumberland, most notably in Redesdale and North Tynedale. On these better preserved upland sites, the internal arrangements more often than not follow a standard pattern: a pair of hollowed stock yards lying one on either side of a paved causeway which leads from the entrance to a row of round-houses situated towards the rear of the enclosure. Behind the houses, which generally number between three and six, there is often a clear space which may have functioned as a stack yard or garden.

Excavations undertaken by Jobey in the late 1970s on a small and geographically isolated group of rec-tilinear settlements in North Tynedale have shown that some sites of this type were preceded by timber-built versions with origins going back to the late pre-Roman Iron Age and that their final rebuilding in stone did not take place until some time in, or after, the mid-second century AD (Jobey 1983). What is not known, however, is how far this model may be applicable to other, less remote parts of Northumber-land, though excavations on a handful of rectilinear sites, such as Doubstead in the lower Tweed valley or Marden on the south-east coastal plain, have already shown that timber buildings, which could belong to either the pre-Roman Iron Age or the Roman period, do indeed exist on certain of these sites. More re-cently, excavations on rectilinear settlements at East

Fig. 4.28. Cropmarks reveal a large, rectilinear ditched enclosure with an entrance in the E-facing side. Within the enclosure, near the upper right hand corner, a small sub-rectangular mark may represent an Anglo-Saxon Grubenhaus.

Brunton and Newcastle Great Park, to the north-west of Newcastle, and Pegswood, north of Morpeth, have revealed complex sequences of Iron Age occupation and contemporary field systems (Proctor 2003; Speak pers comm). So far, none of these three sites appears to have yielded any datable Roman artefacts or traces of stone-built roundhouses. While this may suggest that these particular sites were abandoned before the Roman period, the destructive effects of medieval and later ploughing must also to be taken into account.

Where the foundation trenches of *timber* roundhouses are visible as cropmarks within settlement enclosures of either rectilinear or curvilinear form, the possibility of a pre-Roman origin arises, as it has long been believed that stone-built roundhouses belong exclusively to the Roman period in the North, having made their first appearance no earlier than the mid-second century AD. However, as already noted above, there is now a growing suspicion, based on evidence from both field survey and excavation, that this may not be the whole story and that on some sites at least, stone-founded roundhouses may have made their first appearance in the late pre-Roman Iron Age.

For example, in recent excavations on two overlapping settlements at Fawdon Dean 1 and 2 (Fig. 4.29), a radiocarbon date was obtained which, after calibration, gives a *terminus post quem* of 370BC–AD10 for the construction of a round stone-built house (GU-9205; ASUD 2000, 43). Broadly similar dates have been obtained in excavations at the Dunion hillfort near Jedburgh and likewise suggest that stone-walled roundhouses were introduced somewhere in the period 200BC to AD125 (Rideout 1992). Taken at face value this may mean that stone-built houses made their first appearance in the Tyne-Forth region during the Late pre-Roman Iron Age. If so, this could help to explain their presence on settlements that have recently come to light in close proximity to Hadrian's Wall in areas where one might expect the local population to have been removed by the Roman military authorities (Gates 2004). At the same time, a longer chronology for stone architecture would make it easier to account for the existence of multiple phases of stone-built settlement which have been shown to overlie several hillforts within the Northumberland Cheviots (Oswald *et al.* 2006).

As indicated above, any attempt to determine the pattern of settlement during the Late pre-Roman Iron Age and Roman periods must allow for the continued occupation of Iron Age forts and defended settlements into the Roman period even though, in the case of cropmarks particularly, there is at present no reliable means for estimating what proportion of these sites may be involved.

Another type of settlement which merits consideration here is that which consists of an enclosure formed by two *widely spaced* ditches that are more or less concentric in plan (Appendix F). Here, a defensive function does not seem to be implied and the space enclosed by the outer ditch can perhaps best be

Fig. 4.29. Parchmarks reveal two overlapping settlement enclosures, one of which is oval in shape and the other sub-rectangular. Both have entrances on the SE-facing side (nearest to the camera), and the larger sub-rectangular enclosure also has at least one annexe attached. Both sites have been levelled by narrow ridge and furrow ploughing here seen as straight, parallel lines aligned with the slope of the hill. Excavation has shown that these sites were occupied in the Late Iron Age and Roman periods.

accounted for as a compound for stock or, less likely, as land set aside for use as a meadow or the cultivation of crops. On this basis it would be possible to see such outer enclosures as functionally equivalent to those annexes which, it has been suggested, were sometimes added to Iron Age forts at a relatively late stage in their existence, probably shortly before or during the Roman period. So far, only one site of this kind has been excavated in Northumberland, at Burradon 1 (NZ 269 729) on the coastal plain north of Newcastle (Jobey 1970). Here the two enclosure ditches were almost perfectly concentric and spaced 10–30m apart. As originally published, the two ditches were seen as representing successive settlements, respectively of Early Iron Age and Roman date. However, an alternative interpretation, in which an unenclosed settlement dating to the early or mid-first millennium BC was followed, perhaps after a lengthy interval of time, by a twin-ditched enclosure of the late first or second centuries AD, was subsequently put forward by the excavator (Jobey 1985). As before, only large-scale excavation will show the extent to which this model may have any general validity.

Land boundaries and field systems

In Northumberland in recent years, aerial photography has played a leading role in the identification of extant field systems of prehistoric and Roman date, especially in upland parts of the county. By contrast it has proved much more difficult to detect comparable evidence in lowland contexts, though some progress in this direction has been made and the aerial photograph transcriptions produced for this study allow some of this new evidence to be studied in detail for the first time.

There are, for example, a number of instances where ditched boundaries, apparently delineating sub-rectangular fields or stock enclosures, have been recorded as cropmarks in more or less close proximity to late prehistoric or Romano-British settlement sites. There are several instances where a good case can be made for interpreting these boundaries as contemporary with the adjacent settlements. Examples include a rectilinear site at Tillmouth Farm East (UID 1385207; NT 8943 5546), where the ditch marking the north perimeter of the settlement is prolonged to the west to form one element in a somewhat irregular pattern of land boundaries. Likewise at Norham West Mains 1 and 2 (UID 4051; NT 9131 4817), ditches projecting outwards from two conjoined settlements appear to represent fragments of field boundaries.

In addition to the above, there are numerous cropmark sites where ditched boundaries detected close to settlements strongly suggest the presence of a contemporary field system, even though there may be no physical connection between them and the settlement enclosure itself. On the south side of the Till, close to its confluence with the Tweed, for example, a network of intersecting ditches could well represent a series of fields associated with a cluster of three separate rectilinear settlement enclosures near St Cuthbert's Farm (UID 1403; c. NT 868 426). Again, a very similar situation exits 3km to the north-east, in kilometre square NT 89 44, where a more extensive but less regular complex of boundaries can plausibly be associated with a group of five rectilinear settlements. Instances such as this bring to mind certain upland landscapes, such as Brands Hill near Wooler (*c.* NT 980 240) or The Butts in upper Redesdale (NY 910 907), where stone-built settlements of Romano-British type are integrated into a landscape that has been divided into sub-rectangular fields by rubble banks or walls (Gates 1982). In the case of the cropmark sites we are discussing here, where the putative fields are defined by ditches rather than by upstanding boundaries, it may be that some of the missing sections were originally formed by banks, walls or hedges, which would not be expected to leave traces in the form of cropmarks. Where upland sites are concerned, double-walled trackways leading from the settlement complex to unenclosed pasture beyond the fields are a regular component of the agricultural landscape in the late prehistoric and Roman periods and have been recorded on well over a dozen sites. By contrast, with only one or two possible exceptions, such trackways have not yet been recognised as cropmarks where lowland field systems are concerned. Again, the most likely explanation for this is that such trackways, if they did indeed exist, were normally bounded by walls, hedges or fences rather than ditches. Certainly their absence from the existing air photographic record could be no more than a matter of chance and need not imply that there was any shortage of unenclosed grazing in lowland areas in the late first millennium BC, or that stock rearing was any less important here than it was in the uplands.

In those parts of Northumberland where soils are most conducive to the development of cropmarks, single-ditched enclosures which can at least potentially be interpreted as settlements of the Late pre-Roman Iron Age or Roman periods may reach densities as high as 60 sites per $100km^2$. Within the survey territory, sites of this order are most abundant in parts of the Tweed valley, where they regularly occur at more or less regular intervals, 250–750m apart, particularly on the south side of the river between Coldstream and Berwick. Without begging the question of which sites may be contemporary, it would be possible to envisage a landscape of dispersed farmsteads and fields extending over much of the landscape during, or even shortly before, the Roman period, with the highest concentrations of sites occurring within easy reach of rivers and permanent watercourses. Judging from published pollen diagrams (e.g. Davies and Turner 1979 and this volume, Chapter 2), it would also seem that there was a gradual increase in cereal production during the late pre-Roman Iron Age and Roman periods, perhaps coupled with a more rigorous differentiation between arable and pasture land as field systems became larger and more complex.

Paired, conjoined and superimposed enclosures

As the aerial photographic transcriptions demonstrate, there are a number of instances where single-ditched enclosures co-exist in close proximity to one another or are actually conjoined, having one side in common. Examples of such sites include Norham West Mains 1 and 2 (UID 4051 and 1383163) and West Burn 1 and 2 (UID 4042). Here rectilinear and curvilinear enclosures are situated side by side, while at Chapel Stream 1 and 2 (ID 1403) and Wideopen Plantation 3 and 4 (UID 1385207), rectilinear enclosures are actually joined together. Again, at Crookham Westfield (UID 1383998), a rectilinear settlement containing at least one visible roundhouse is accompanied by several smaller and less regularly shaped enclosures, one of which is attached to the perimeter of the settlement itself. While a relationship of some kind can reasonably be inferred in each of these cases, it is not possible to say with certainty whether the enclosures involved were in use at the same time or whether one succeeded the other. On the other hand, where enclosures are actually conjoined, we may well suspect that they were indeed broadly contemporary, perhaps resulting from an expansion of the original settlement nucleus over time.

On this point it is legitimate to draw attention to the fact that paired or conjoined enclosures are not infrequently a feature of stone-built settlements of Roman-British type, which occur as earthworks in upland parts of Northumberland. Amongst other well known examples of this phenomenon, one might mention sites at Ring Chesters, Brands Hill and South Heddon in the northern Cheviots, The Butts in upper Redesdale and Bran's Walls in the uppermost reaches of North Tynedale. In all these cases it is interesting to note that one of the paired enclosures contains stone-built roundhouses which may, as at Brands Hill and South Heddon, be packed close together, filling most of the available space and sometimes spilling out beyond the perimeter bank. By contrast, the second enclosure is usually devoid of recognisable house foundations or platforms, implying that it was not used for habitation but for some other purpose, the most likely possibility being that it was an enclosure for stock. At Brands Hill North, The Butts and possibly South Heddon too, an interpretation along these lines is strengthened by the existence of walled trackways that led out from the 'empty' enclosure to unenclosed pasture lying beyond the limits of a field system, which may have been reserved for arable crops or hay, at least during the growing season (Gates 1982).

If some or all of the paired enclosures that have been documented as cropmarks in the survey territory can be accounted for along these same lines, then this too would suggest a greater degree of differentiation between arable and pasture land in this lowland landscape during the late pre-Roman Iron Age and Roman periods than has previously been apparent.

Instances of superimposition, where two or more settlements overlie one another in such a way as to indicate that they cannot be contemporary, are relatively rare in this area, at least in so far as they can be identified from air photographs. As mentioned above, sites of the prehistoric and Roman periods tend to be spaced at fairly regular intervals, 250–750m apart, over large swathes of landscape. Notwithstanding the question of contemporaneity, this may mean that the general pattern of settlement across the landscape was relatively stable, with settlement nuclei, once established, remaining viable for lengthy periods of time.

In addition to the two overlapping enclosures at Fawdon Dean 1 and 2, referred to above (Fig. 4.29), one other particularly interesting instance of superimposition deserves mention here. This involves a bivallate hillfort at Cornhill (UID 1401; NT 8599 4020; Fig. 4.24), which was first recorded in the 18th century as a badly robbed earthwork but is now visible only as a cropmark. The fort occupies the crest of a large drumlin and its plan, which is egg-shaped, reflects the teardrop shape of the ridge with the narrow end pointing east, matching the direction of the original ice flow. As shown in the illustration, two other enclosures, one of which is strictly circular and the other rectangular, fit neatly inside the twin ditches of the fort. While their relation on plan indicates that these enclosures are probably later than the fort, it is not immediately apparent what kinds of structure they represent or to what period they belong. They could, for example, be accounted for as native settlements of the late pre-Roman Iron Age or the Roman period and might even be Roman military sites. Certainly, this particular summit, which commands wide views over the surrounding countryside, extending as far as the Eildon Hills to the west and Berwick to the east, has many strategic advantages and would be an ideal position for a signal station. On the other hand, both enclosures are larger than would normally be expected for a Roman signal station, with maximum dimensions of about 50m across. An alternative possibility is that they represent fortifications or artillery emplacements dating to the sixteenth or early seventeenth centuries when cross-Border warfare was endemic. Here it may be significant that the site directly overlooks Cornhill Castle which is situated on the south bank of the Tweed, 600m away to the north-west. In 1549, Cornhill Castle was captured by a force of Scots under the command of a French officer and although artillery could well have been used in this attack, the earthworks which we are discussing do not have the appearance of artillery platforms of this date. Nor indeed can they be passed off as military installations of WWII (Roger Thomas pers comm). Having exhausted all of the more obvious explanations, the identity of these intriguing enclosures must for the time being remain a mystery.

Roman military remains

Except for a series of short episodes between AD 70 and 180, and amounting in all to not much more than 60 years, all of Northumberland north of Hadrian's Wall lay outwith the formal boundaries of the Roman Empire. This does not of course mean that the native tribesmen were beyond the control of the Roman military authorities and we can be sure that the local population was subject to regular surveillance by patrols sent out from the Wall and its associated outpost forts at High Rochester and Risingham.

For communication and the rapid movement of troops, the newly established road network would of course have been of crucial strategic importance to the Roman army. The only certain Roman road which passes through the survey territory is that known as the Devil's Causeway (see Gates and Hewitt 2007 for further discussion). This branches off from Dere Street a short distance north of Corbridge and then runs in a north-easterly direction for 80km as far as the mouth of the Tweed. Although no Roman fort or supply base has yet been identified on either side of the river, at Tweedmouth or Berwick, it would be surprising if one did not exist at what must undoubtedly have been a point of considerable strategic importance. Indeed the whole course of the lower Tweed, with its many fords and crossing points, is likely to have been carefully monitored and guarded by the Roman army, especially during the conquest period in the late first and early second centuries AD. Indeed, it could well be during this phase that two temporary camps were established on the south side of the river at Groat Haugh near Norham (UID 1334; NT 8897 4542) and at East Learmouth (UID 1118; NT 8705 3698). Both camps were discovered by means of air photography and have been fully documented by the former RCHME in their volume on 'Roman Camps in England' (Welfare and Swan 1995, 95 and 118).

Two short stretches of the Devil's Causeway Roman road have likewise been identified on air photographs in the vicinity of Glanton and Wooperton, at NU 0506 2060 (UID 1380556) and NU 0513 2020 (ID 1380589). In both cases, the course of the road is marked by side ditches and quarry pits which have been recorded from the air as either cropmarks or parchmarks. At NU 0511 2027 (UID 1380553), a small rectangular ditched enclosure, measuring 12m by 9m, is situated next to the road and could perhaps represent a Roman monument of some kind.

THE EARLY POST-ROMAN LANDSCAPE (*c.* AD 500 to AD 1000)

One of the most promising new developments arising from air photography in Northumberland over the last 25 years has been the recognition, for the first time in North-East England, of the *Grubenhaus*, a type of building that is absolutely characteristic of the Anglo-Saxon period (Tipper 2004). Proof that structures of this kind can indeed be identified as cropmarks has so far been confirmed in excavation only at the site of New Bewick (UID 5828; NU 0513 2064; Fig. 4.30) in the upper Till valley (Gates and O'Brien 1988). Here, the putative *Grubenhäuser* form just one element in a large complex of cropmarks that extends for a considerable distance over the surface of a raised gravel terrace. As presently known, this same complex includes an irregular pattern of linear ditches and pit alignments, ring ditches, pits and several small and irregular enclosures. By analogy with excavated Anglo-Saxon sites elsewhere in England, one might anticipate that these *Grubenhäuser*, and others within the study area, were accompanied by rectangular timber buildings of post-hole construction. The fact that no such buildings have been identified on air photographs is not at all surprising given the near-impossibility of recognising individual post holes as cropmarks.

In addition to those at New Bewick, other cropmarks which can also be recognised as *Grubenhäuser* have been identified at a further twelve locations within the survey territory (Appendix F; Fig 4.31). Additionally, large-scale open area excavation at Cheviot Quarry and Lanton Quarry has identified three post-Roman rectangular buildings (Johnson and Waddington in press) and an Anglo-Saxon settlement with eight *Grubenhäuser* and four post-built buildings (Waddington and Johnson in press). All this new evidence represents a welcome addition to our knowledge of early post-Roman settlement in an area which was until recently dominated almost exclusively by palaces and high-ranking settlements of the kind represented at Yeavering, Milfield and Thirlings. The new evidence suggests that lower-status Anglian settlements may be much more common in this area than has previously been supposed. Most of the new sites are situated on low-lying gravel terraces close to watercourses. However, given the small number of sites involved, and the difficulties inherent in recognising *Grubenhäuser* as cropmarks on heavier soils, it is not presently clear how significant this apparent association with river terrace deposits may turn out to be.

As at New Bewick, where *Grubenhäuser* occur as

Fig. 4.30. A complex of cropmarks at New Bewick includes a pit alignment, ditches and enclosures as well as a network of naturally occurring ice-wedge casts. Also visible are a number of small, sub-rectangular marks of uniformly light tone which, as excavation has shown, correspond to Anglo-Saxon Grubenhäuser.

part of a complex of cropmarks, it may be no easy matter to decide which, if any, of the accompanying features may be contemporary. However, as fenced enclosures or small yards are a recurring feature at both Thirlings, Yeavering and Lanton Quarry (Hope-Taylor 1977; Gates and O'Brien 1988; Stafford 2007), we may suspect that some, at least, of the similarly sized fenced or palisaded enclosures identified from air photographs at New Bewick may likewise be of Anglian date.

Immediately west of Norham, four possible *Grubenhäuser* occur as part of a large complex of enclosures, ditched boundaries, pits and trackways (UID 1383400; *c*.NT 894 472; Fig. 4.32). Here there is the intriguing possibility of a connection of some sort with the historically attested settlement of Ubbanford, which is mentioned by the chronicler Simeon of Durham (d. AD 1130) in his '*Historia Regum Anglorum et Danorum*'. In an entry corresponding to the year AD 854, Simeon lists Ubbanford as one of the *vills* belonging to Lindisfarne. Unfortunately, because we have no knowledge of what sources Simeon had available to him, there is no way of knowing when Ubbanford was granted to Lindisfarne or whether it was included in the original foundation grant of AD 635. On the other hand we do know that Norham was the centre of a shire and that it was in the hands of Lindisfarne no later than the mid-9th century (O'Brien 2002). Certainly it is by no means impossible that the *Grubenhäuser* now identified by aerial photography could relate to a settlement which was already in existence by the 7th century and later came to be known as Ubbanford. Interestingly, the Norham site lies close to a crossing place over the Tweed on the inside of a bend in the river, but at the

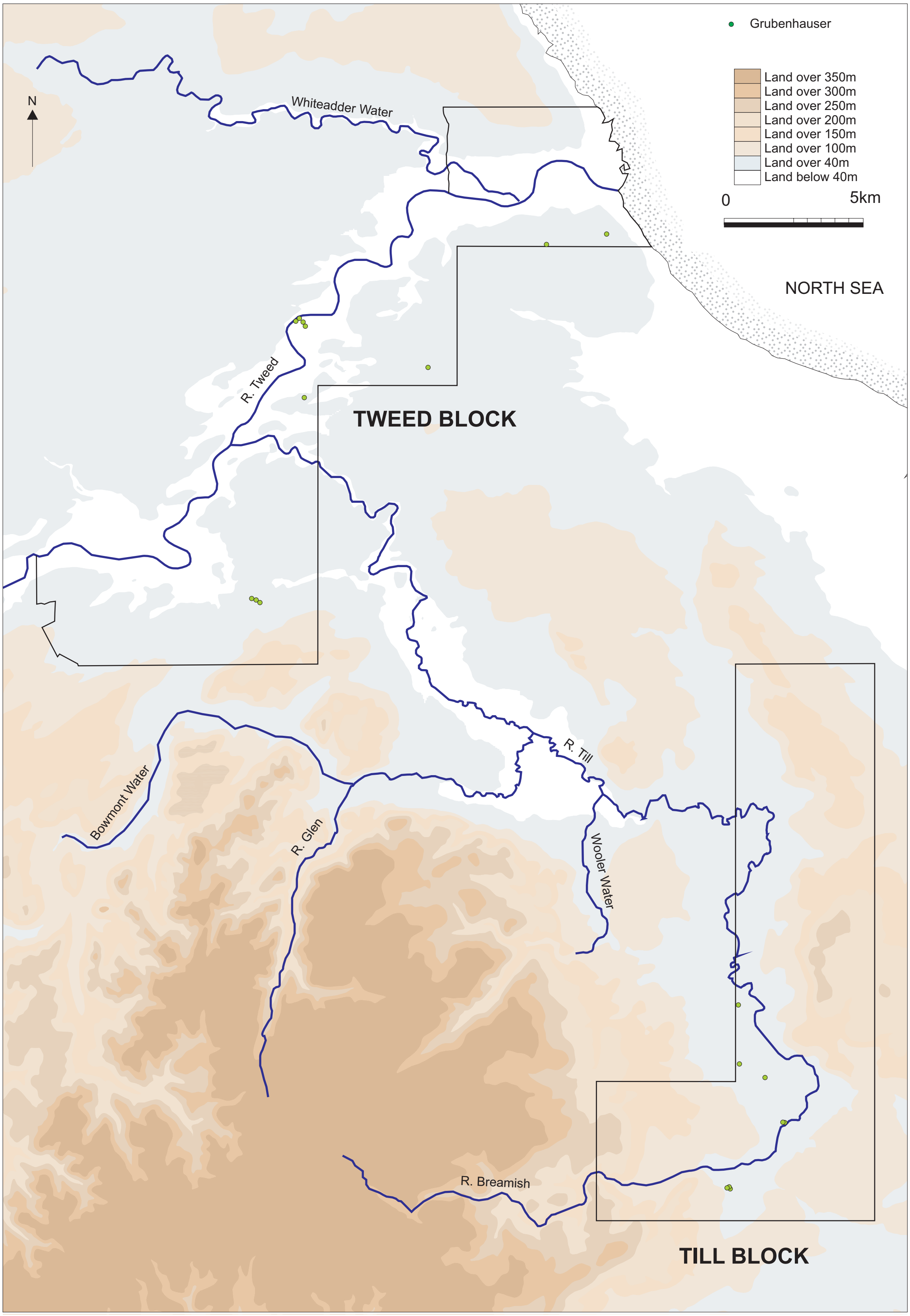


Fig. 4.31. Distribution of Grubenhäuser (cropmarks).

Fig. 4.32. A complex of cropmarks lying to the west of Norham village, includes ditches, enclosures and a trackway as well as several probable Grubenhäuser of Anglo-Saxon date. This raises the interesting possibility that the site corresponds to the historically attested village of Ubbanford.

same time remains comfortably above flood level. In these respects the location bears comparison with other well known Anglian sites in this region, including for example Old Melrose and Sprouston, and one wonders to what extent the Tweed may have been important as a means of communication and transport, not only in this period but in earlier times as well.

The recognition that settlements incorporating *Grubenhäuser* are more widely distributed within the survey area than has previously been recognised brings into even sharper focus an old problem, namely when and in what circumstances did the stone-built native farmsteads of the Roman period go out of use, and what social and territorial changes are implied by the transition to early medieval forms of settlement as they are now coming to be recognised? For, as Professor George Jobey pointed out more than twenty years ago in his 1982 Rhind Lectures, no Roman pottery has yet been found on any native settlement north of the Wall which could have been manufactured after AD *c*.360, and only four sites (Huckhoe, Traprain Law, Murton Crags and Hownam) have yielded Roman pottery dateable to the 3rd or 4th centuries. Yet, as was also stated at the time, common sense dictates that this cannot be the end of the story so far as native settlements in this area are concerned and it is to these same native sites that we must look in seeking to elucidate the nature of settlement in the 5th to 7th centuries. At the same time, it will need to be explained in social terms how a landscape that was populated mainly by dispersed farmsteads and enclosed fields was eventually replaced by one in which nucleated villages and open field agriculture were the norm. With these questions in mind, it is interesting to note that four of

Fig. 4.33. The photograph shows a circular embanked enclosure which excavation has shown to be of Late Iron Age date. Within it, a number of stone-built structures are visible. These have not been excavated and, though clearly later in date than the surrounding earthwork, their precise context remains uncertain though it has been suggested that they may represent an early medieval monastic settlement.

the newly recognised *Grubenhäuser* are located close to prehistoric or Roman-British settlement sites – namely Marl Bog, Gallow Law, Tillmouth Farm and Bewick Bridge West – and in one case (Marl Bog) a *Grubenhaus* is actually situated inside the ditched enclosure (Fig. 4.28). While this cannot be taken as convincing evidence of continuity of occupation, it may indicate that incoming Anglo-Saxon settlers were, in some instances, attracted to earlier settlement sites (Alcock 1988). This supposition is further supported by the situation at Lanton Quarry where one of the *Grubenhäuser* partly truncates an earlier circular building that has produced a 5th century AD date from one of the post holes (Waddington and Johnson in press).

One other site which may also find a home in this period is the circular embanked enclosure on the lower slopes of Ingram Hill (UID 1033874); NU 0114 1577; Fig. 4.33). For, while excavation has shown that the enclosure itself began as an embanked palisade of late Iron Age date (Jobey 1971), it contains as many as five small rectangular stone-built structures which could conceivably belong to the early medieval period (Frodsham 2004). Considered in this light, the recent suggestion that Ingram was the centre of a sixth-century estate belonging to Lindisfarne may not be without relevance (O'Brien 2002).

MEDIEVAL AND LATER REMAINS

While this analysis of the air photographic data ends here, the aerial photographic transcriptions produced by this study depict a broad range of features of relevance to later periods from the Conquest to the present day. Thus, the sites of medieval and later villages, numerous tracts of ridge and furrow ploughing (including many which no longer survive as visible earthworks), areas of bell-pit mining, and Second World War military installations are all depicted in so far as they can be recognised from air photographs. Readers whose interests embrace this later material are invited to consult the maps and related documentation held by the Northumberland Historic Environment Record.

5 Uncovering the Past: Evaluation Trenching of Cropmark Sites

Clive Waddington

with contributions from Alex Bayliss, Alex Gibson, Jacqui Huntley, Harry Kenward and Peter Marshall. (Where no name is stated the author is Clive Waddington.)

INTRODUCTION

In order to improve understanding of the varied crop and parch mark sites in north Northumberland a programme of evaluation trenching was undertaken to assess certain classes of monuments, address outstanding research questions and to gain information relating to the condition of preservation of buried remains on different landforms. A total of eight sites was examined (Fig. 5.1) including one henge-type monument (Coupland), a boundary feature (Milfield North), a ring ditch (Turvelaws), two curvilinear palisaded enclosures (Threecorner Wood and Hetton Hall), a rectilinear enclosure (Flodden Hill), a pit alignment (Redscar Wood), and an area immediately adjacent to the extensive Anglo-Saxon cropmark complex at Maelmin (Maelmin West). The level of preservation varied from site to site. In some cases there were unexpectedly well-preserved remains, as on the Cheviot slopes at Flodden Hill. In others there was barely any intact integral stratigraphy, as was the case at Turvelaws. The sites were selected according to a range of criteria that included landowner permission, type of landform element and geology, type of feature and the probable ability of the site to answer research questions. Table 5.1 summarises the different sites investigated.

METHODS

A single evaluation trench was laid out across each of the sites to be investigated, with the exception of the area at Maelmin West where four trenches were excavated. In most cases this consisted of a narrow linear trench although in some instances the trenches were enlarged to encompass areas of interest, as was the case at Flodden Hill. All the sites were located within

Site Name	Type of Monument	Period	Geology	Landform Element (see chapter 2)
Coupland	Henge	Neolithic – Early Bronze Age	Late Glacial sand and gravel terrace	1d
Milfield North	Boundary and Pit	Neolithic	Late Glacial sand and gravel terrace	1d
Turvelaws	Ring Ditch	Early Bronze Age?	Holocene alluvium	2b
Threecorner Wood	Curvilinear Palisaded Enclosure	Late Bronze Age – Iron Age	Late Glacial fluvially derived sand	1d
Hetton Hall	Curvilinear Palisaded Enclosure	Late Bronze Age – Iron Age	Undifferentiated drift comprising till over Fell Sandstone	1b
Flodden Hill	Rectilinear Enclosure	Terminal Iron Age – Romano-British	Undifferentiated drift derived from Cheviot	1b
Redscar Wood	Pit Alignment	Romano-British – Post-Roman	Late Glacial sand and gravel terrace	1d
Maelmin West	Field System and Building	Anglo-Saxon	Late Glacial sand and gravel terrace	1d

Table 5.1. Summary of sites investigated by evaluation trenching.

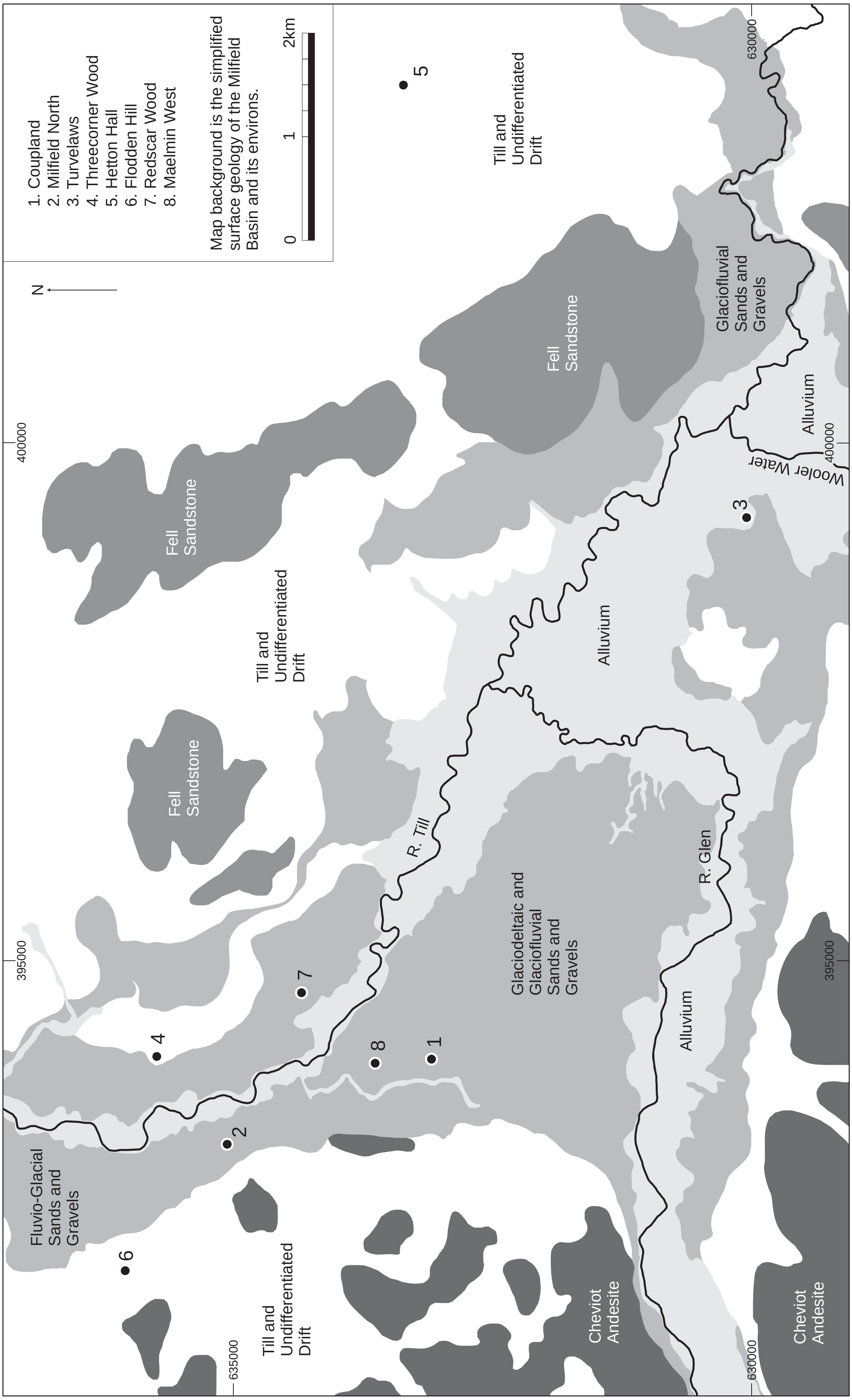


Fig. 5.1. Sites investigated by evaluation trenching.

farmland given over to agriculture or pasture and so had a topsoil cover that was either an active or relict ploughsoil. In all cases the topsoil was removed by machine down to the start of the archaeological horizon, which in most cases was coincident with the top of the substratum, whether this was sand and gravel, till or alluvium. Each trench was then cleaned by hand and all archaeological features were mapped and sampled. All excavated material was passed through a 10mm sieve to maximize finds recovery. Charred material was separately bagged and organic deposits were environmentally sampled. Once excavation was complete the trenches were backfilled by machine and the soil compacted.

Fig. 5.2. Aerial photograph showing the Coupland 'henge' and 'droveway'.

COUPLAND 'HENGE' AND 'DROVEWAY'

Introduction

The Coupland 'henge', or enclosure (SMR number NT93SW28), survives as a cropmark visible on aerial photographs (Fig. 5.2) with only slight surface traces visible on the ground. The site has been variously termed a 'camp' (MacLaughlan 1867), 'henge' (Atkinson 1950; Harding 1981) and 'enclosure' (Waddington 1997). There is clearly ambiguity over the morphological and functional status of this monument (see also Waddington 2001). Although it is readily acknowledged that by virtue of it having an inner ditch, external bank and opposed entrances it contains some of the defining morphological elements associated with a henge (see Burl 1969; Wainwright 1969; Harding and Lee 1987), the differences in scale and layout compared to the other henge monuments of the Milfield Basin, and the suggestion of a possibly earlier origin resulting from this investigation, have prompted this author to use a more neutral description until further data is forthcoming. Therefore, the Coupland monument is referred to as an enclosure or 'henge' throughout this section. Although the author has previously proposed a tentative interpretation for this monument that assumes an Early Neolithic origin (Waddington 1999, 134–43), he retains an open mind on its actual chronology pending the results of further research. On the basis of present evidence the monument is known to have been constructed and used sometime after 3900 BC but before 1800 BC (see below). The functioning of this monument as a henge is not discounted (e.g. Waddington 1999, 162) but further excavation is required to establish its dating and purpose.

The Coupland 'henge' is one of at least 11 ditched enclosures in the Milfield Basin with morphological characteristics akin to those of henge and henge-related monuments. It is located at NT 94053308 just above

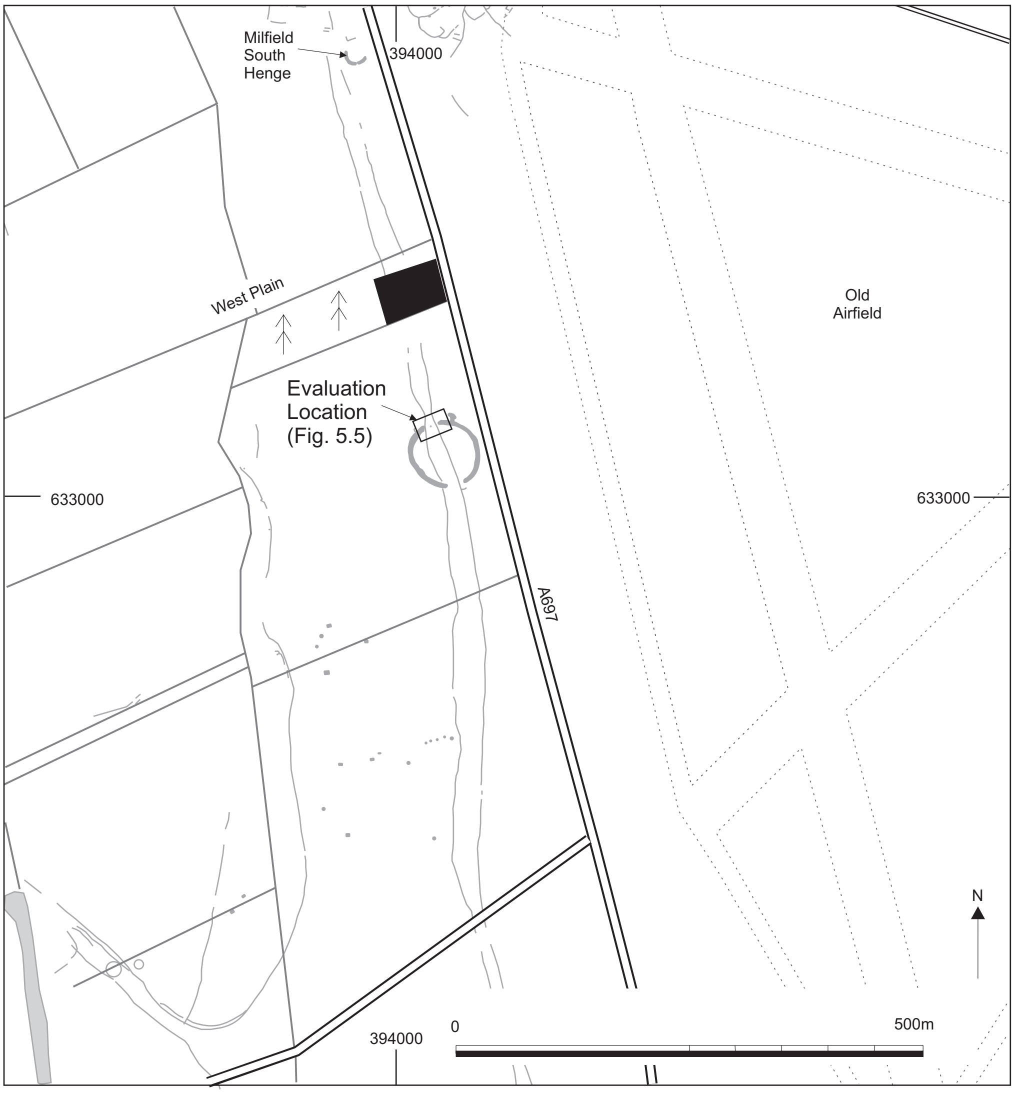


Fig. 5.3. Coupland 'henge' site location.

48m OD on one of the highest points of the late glacial fluvio-deltaic gravel terraces (Fig. 5.3). The site occupies a central location within the basin on the west side of the River Till situated on free-draining fertile ground in an area that forms the natural geographic focus for the region. Although the monument commands wide views to the encircling horizon of hills, it is also in a highly visible position itself from most locations on any of the surrounding hills. This, by far the largest of all the Neolithic henge-related monuments, is at the geographic heart of the Late Neolithic/Early Bronze Age ritual complex, a location unlikely to be fortuitous. The land is free from flood risk, lying on a free-draining terrace above the floodplain of the Holocene alluvial valley floor. The soils have been characterised by Payton as argillic brown sands and brown podzolic soils (Payton 1980). The topsoil is characterised as a slightly stony sandy loam. Today the field is under an intensive arable regime that includes cycles of winter wheat followed by potatoes. Ploughing for the latter crop requires subsoiling which means deep-ploughing and ridging up of the soil. This has heavily truncated the archaeology in and around the site. Plough penetration down to the sand and gravel substratum is frequently evidenced by the presence of the conspicuous orange sand and gravel spreads on the surface after ploughing. The archaeological deposits of this nationally important monument have been so heavily degraded since the mid 20th century, when the upstanding remains were recorded by Atkinson (1950), that today there is a barely perceptible rise in the ground surface where the banks had once stood. Although heavily truncated, the excavations revealed deposits that can still provide important information relating to date, form and function. Since the evaluation the site has been set aside from further cultivation as part of a Countryside Stewardship Scheme agreed by the landowner and Northumberland County Council.

The aerial photographs show the Coupland site to be slightly ovoid in form with the ditch cut to a regular width with slightly squared terminals. Slight traces of the bank, surviving up to 0.1m above the surrounding ground surface, can be observed on the south and west sides of the enclosure. Very slight traces of the inner ditch can be seen on the east side as it bends round towards the field boundary. The enclosure bank on the east side lies underneath the modern A697 trunk road and this is visible as a slightly raised section of road where it overlies the bank. The topographic survey (Fig. 5.4), undertaken using a plane-table, shows the monument to be approximately 120m north to south by 100m east to west externally. However, the east to west measurement is partly estimated as the outer bank on the east side now lies below the A697. The interior of the enclosure is flat, although a depression visible on the north-east side of the enclosure, encroaching on to the position of the enclosure bank and ditch, is the remains of a later gravel quarry scoop. This is visible as a dark sub-oval patch on aerial photographs.

The aerial photographs also reveal a double-ditched linear feature with non-parallel sides varying between 15m and 30m apart, with a slightly meandering course, passing through one entrance of the enclosure, across its interior and through the opposing entrance. There has been debate as to the morphological and functional status of this feature, referred to variously as a 'droveway' (Atkinson 1950; Waddington 1997, 144; 1999, 134), an 'avenue' (Harding 1981, 89) and a 'cursus'. Indeed Bradley (1993, 119) even argued that it could be an early medieval royal roadway linking the royal estate centres of Ad Gefrin (Yeavering) and Maelmin. This linear feature, which is referred to as the 'droveway' throughout this report, appears to have been built in discrete sections suggestive of gang labour, as slight changes in direction can be observed on the aerial photographs where sections of the droveway ditches meet. Other features are associated with the droveway that, on its own, runs for 1.7km across the gravel terrace. North of the Coupland enclosure the droveway passes to the immediate west of the Milfield South henge, suggesting a connection with this monument that has its one visible entrance facing towards the droveway. The direction of the entrance suggests that this monument was approached from the north-west along the line of the droveway. A number of pits also appear to be positioned along the course of the droveway close to the ditches in this northern section, as Harding identified two on aerial photographs and indeed encountered two pits and some scoops as a result of his small cutting across the feature in this area (Harding 1981, 89–3). South of the Coupland monument a short irregular alignment of pits can be observed running off from the droveway in a westerly direction (Harding 1981, 91). Further to the south the droveway appears to skirt between the East Marleyknowe henge and a ring-ditch feature, which implies that the droveway is later than this hengiform monument. A circular feature can also be observed within the confines of the droveway in this southern section. However, one of the significant findings of this work has been the relationship between the droveway and natural landforms that extend this bounded corridor at both its north and south ends. Inspection of the terminals of this linear feature on the ground, together with subsequent detailed geomorphological mapping, shows that at the north end the droveway leads to a deeply incised gulley leading down to the River Till, having been carved out of the gravel terrace by the Meldon Burn. This area of the Till forms one of the natural fording points of the river, as place names here still indicate (e.g. Milfieldford Plantation lies on the opposite bank of the river). This is unlikely to be coincidence, particularly as this is the narrowest part of the floodplain where there is little evidence for the river channel having changed

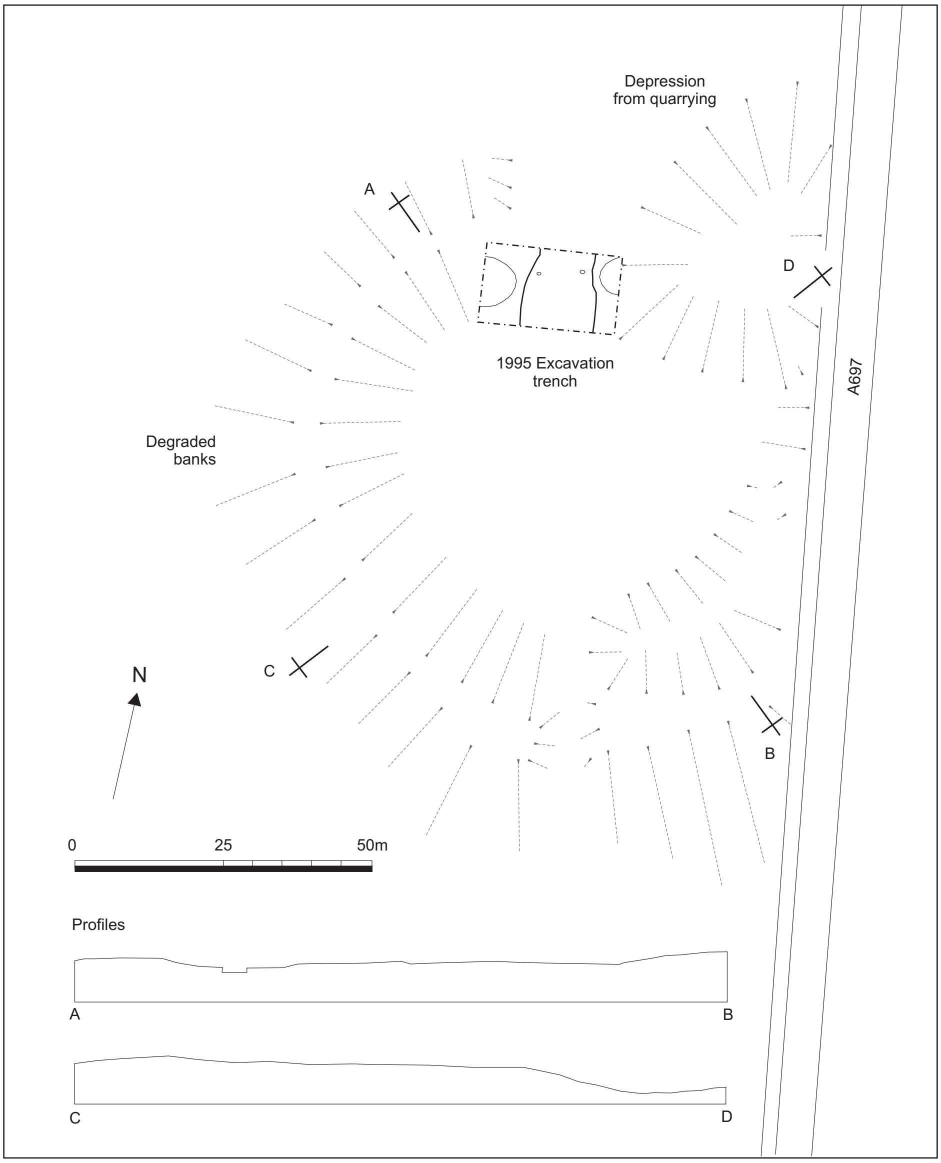


Fig. 5.4. Topographic survey of the site.

its course by more than a few metres. Therefore, it appears that the northern end of the droveway, by continuing along a naturally confined routeway, actually terminates at a fording point of the River Till. To the south the droveway ditches terminate at one of the two natural gullies leading down into the Galewood Depression – a former Late Glacial course of the River Glen inset below the steep scarps of the surrounding sand and gravel terrace. This now dry valley is also a naturally confined routeway, albeit wider than that at the north end, that tracks north-east to the floodplain of the River Till. The recognition of the landscape setting and true extent of this archaeological feature has important implications for understanding this monument and its potential role within the wider ritual complex. This is discussed further below.

Excavation

A single evaluation trench measuring 22.5m east to west by 13m north to south was opened across the north entrance of the monument encompassing the terminals of the enclosure ditches and the linear ditches of the 'droveway' that pass through the entrance (Fig. 5.5). The stubble cover and topsoil were removed manually with no use of machines, as the fragility of these important archaeological remains was unknown. The topsoil comprised a light grey-brown loamy soil with a high stone and gravel content, measuring on average 0.4m deep across the trench. Apart from fragments of modern pottery, glass, metal, field drain and small animal bones, a total of ten lithics (see below Fig. 5.14) was recovered from this unstratified topsoil together with two fragments of Early Neolithic pottery (see below Fig. 5.13) which are described in the small finds section

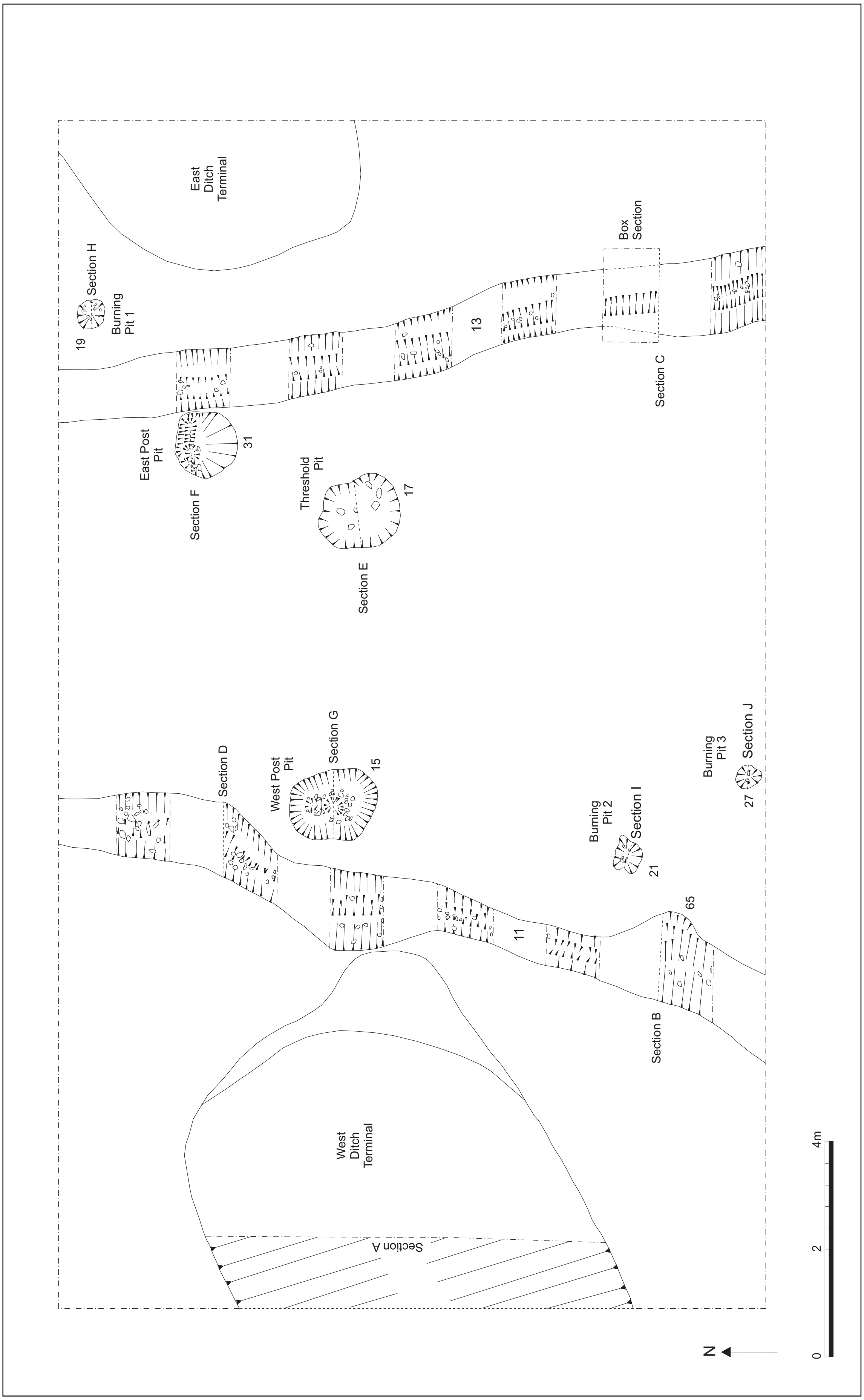


Fig. 5.5. Coupland trench plan.

below. The lithics included diagnostic Early Neolithic forms, and together with the pottery fragments indicate that ploughing of the site continues to disturb Early Neolithic deposits, bringing their contents up into the ploughsoil. This has been observed to be a frequent concern associated with Neolithic/Early Bronze Age sites across the region, as the pottery will only last for a few years in the plough horizon before it disintegrates. Consequently shallow ploughing, or a switch to pasture, should be encouraged wherever possible on cultivated land that hosts known Neolithic/Early Bronze Age remains.

The surface of the substratum was cleaned back to expose a group of truncated archaeological features cut into the sand and gravel (Fig. 5.6). The archaeological features were relatively easy to identify as they were cut into the characteristic orange-grey gravel and for the most part had darker fills that could be easily differentiated. These features included: three small burning pits/hearths, the enclosure ditch terminals, three pits within the entrance causeway of the enclosure, and the linear double ditches of the droveway. In addition to these archaeological features there was also a series of sandy spreads and two areas of compacted gravel. The latter were all excavated and shown to be natural features consisting of shallow hollows in the sand and gravel terrace surface that had become filled with slightly differentiated sediment deposits. Similar sand-filled hollows have been encountered on other excavations across these terrace surfaces (e.g. Maelmin West).

Features

Burning Pits

All three of the pits were visible as small sub-circular truncated spreads averaging 0.3m diameter and 0.13m deep from the beginning of the archaeological horizon (Table 5.2). The pits had a concave profile with rounded sides and base (Fig. 5.7). Pit 1 is located beneath the area that appears to have been occupied by the outer enclosure bank, implying that this feature predates the construction of the enclosure. The other two pits were located near the centre of the south side of the trench within the area of the enclosure and between the two droveway ditches, although no direct physical relationship with these features can be posited. Based on their similar form and appearance they are thought to form part of the same occupation represented by pit 1 (Fig. 5.8). All three pits had experienced *in situ* burning as evidenced by the heat-fused and fire-reddened gravel around their edges, and the high charred content of their fill. The fills were all similar, consisting of a dark grey loam matrix with small fire-blackened stones and charred wood fragments. All the pits produced substantial quantities of charred hazelnut shells, cereal grains including emmer wheat and barley as well as Early Neolithic Carinated and Plain Bowls (see below Fig. 5.13). Samples of charred hazelnut shell from all of these pits have produced a series of radiocarbon measurements that together suggest a period of use during the second quarter of the fourth millennium cal BC. As the pits had experienced *in situ* burning and contained midden refuse in the

Fig. 5.6. View of trench after initial cleaning with the 'droveway' and ditch terminals visible

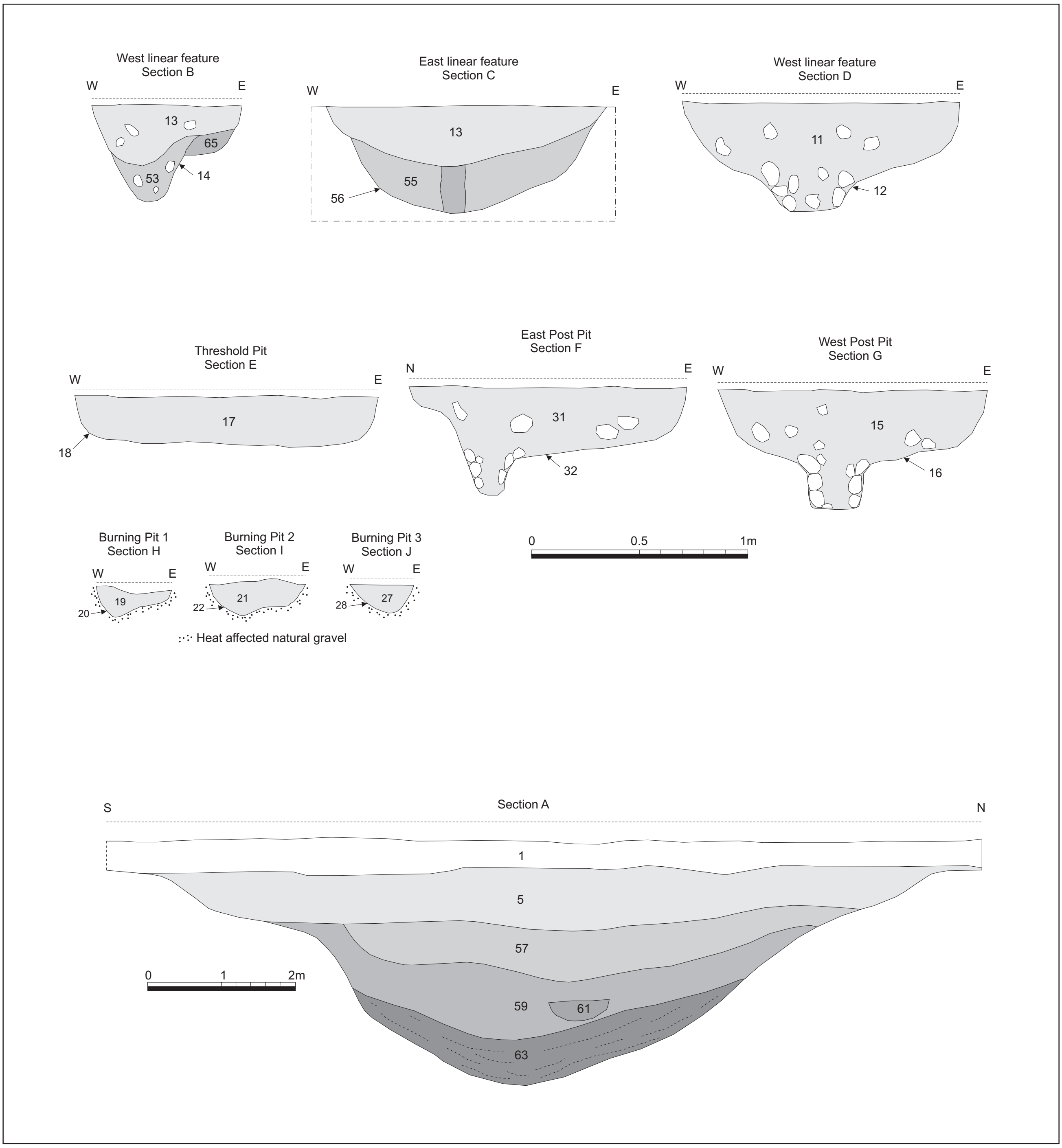


Fig. 5.7. Coupland section drawings.

form of broken cooking and storage pots and charred food remains (hazelnuts, wheat grains and chaff), these features are understood to be the remains of hearths/pit ovens probably used for cooking purposes. This does not discount the possibility that the routine burying of midden material into such pits was not in itself a symbolic act, but their primary purpose appears to be related to settlement activities. There was no evidence for the sherds having been specially placed, rather they appeared to have been thrown in where some broke on impact. Duration of occupation remains problematic on such Neolithic 'pit sites'. It is possible that they represent seasonal settlement aggregations, although they could equally be the only surviving remains of more permanent settlement. As the site was to be later occupied by a large ceremonial monument (see below), this could perhaps imply that this particular location had been thought of as special for many generations before the monument was built. If so, then these pits may indeed represent a site for

Fig. 5.8. View of burning pit 2 after half sectioning. Scale = 10mm graduations.

special occasions during the Early Neolithic. The lack of any surviving structural remains to go with these pits is typical on these kind of pit sites, but evidence for structures may survive outside the confines of the evaluation trench. The presence of the charred hazelnuts is particularly informative as they indicate that gathered resources continued to be exploited alongside the new cultivated foodstuffs represented by the cereal grains and chaff. This implies a varied diet with gathered resources being collected in tandem with new ways of producing food and other resources.

Ditch Terminals

The 'henge' ditch measures 6.5m wide at the beginning of the archaeological horizon and the ditch terminals tended more towards square than rounded ends. A single section, 1.2m wide, was cut obliquely across the west ditch next to the trench edge (Fig. 5.9) as the ground here was more stable and this would help avoid possible collapse of trench edges. Although this provided a slightly angled section across the ditch it allowed an entire stratigraphic sequence to be observed from the ditch base to the modern ground surface. The ditch had a maximum depth of 2.1m below the start of the archaeological horizon, giving a total depth from the modern ground surface of 2.5m. The ditch had a steep-sided u-shaped profile. The edges around the top of the ditch terminal had a purple coloured stain around them that appeared to be a sort of precipitate that had formed as a thin 'contact' layer between the natural gravel and the redeposited gravelly fill. The precipitate was thin, discontinuous and fused giving the impression that it had formed *in situ*. Taking these observations into account this staining was considered to be the outcome of the natural weathering out of minerals on to the ditch edge.

The ditch had a sequence of fills that included primary silt deposits (context 63), with a succession of substantial horizontally bedded deposits (contexts 59, 57 and 5) stratified above (Fig. 5.7). The ploughsoil (context 1) lay directly over the uppermost fill (context 5). A feature (context 61) could be observed cut into the first of the large secondary fills (context 59) and this was sealed by the fill above (context 57). The basal ditch deposits (context 63) consisted of sloping lenses of grey-brown sands and silts typical of primary ditch silts formed as a result of natural inwash and siltation. These basal lenses had a maximum thickness of 0.25m. Above this was a large homogeneous fill (context 59) comprising an orange-brown coarse sand and gravelly fill that appeared to be redeposited ditch upcast. This layer was horizontally bedded and showed no signs of gradual siltation or *in situ* weathering, suggesting that it had accumulated as part of a single event – probably pushing some of the bank material back into the ditch. This deposit had a maximum thickness of 0.75m. At some point after this material had been put back into the ditch, and before a sufficient time interval for a turf or organic layer to form, a pit-type feature was cut into this deposit and filled with a dark grey medium sand with pebbles (context 61). This deposit contained a lot of charred material and included many charcoal flecks

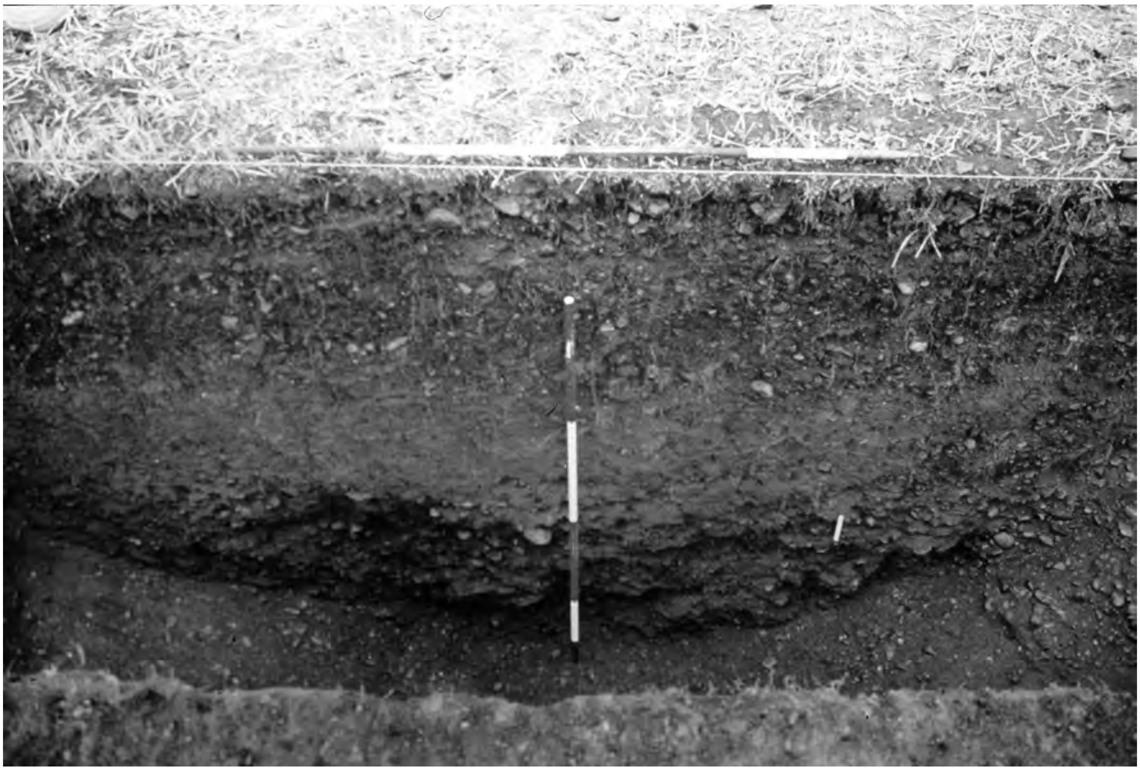


Fig. 5.9. The section through the west 'henge' ditch.

and occasional charred hazelnut shells. No post-pipe was evident in the fill although it was more loosely compacted than the surrounding matrix, suggesting that this pit could have feasibly held some form of upright. Alternatively, however, it could be a fire pit located in the sheltered base of the enclosure ditch, though the pit sides showed no evidence of having been heat-affected. The feature, visible in the east section, petered out in the west section, which indicated that it was a pit rather than a continuous slot running along the ditch bottom. This deposit (context 61) had a maximum depth of 0.3m. Sealing this pit feature was another horizontally bedded homogeneous fill (context 57) consisting of a brown-orange coarse sand with some fluvially rounded pebbles and gravel. This deposit, with a maximum thickness of 0.53m, was also redeposited ditch upcast that probably comprises some of the bank material. This fill had no evidence of siltation, *in situ* weathering or sloping lenses and is therefore considered to be a fill resulting from a single infilling event. The uppermost fill (context 5) consisted of a medium grey loose gravel with a maximum depth of 0.42m. This layer was evidently truncated by the plough in its upper section, although the surviving part of the deposit revealed a relatively homogeneous fill with no obvious indications of gradual siltation. Although all the secondary fills in this ditch section appeared to have resulted from episodes of deliberate infilling, it should be stressed that this is just evidence from one cutting across this enclosure ditch. It would be premature at this stage to assume that this same sequence applies to the entire ditch circuit, based on this one 1.2m wide profile. Further excavations across the ditch, including a longer section of it, are necessary before the ditch sequence for this monument can be understood with confidence.

No artefacts were recovered from the ditch section, and although all the fills were sampled, none of them produced any botanical evidence except for unidentified charred wood fragments and charred hazelnut shells from the fill of the feature (context 61) cut into the secondary deposit (context 59). The lack of any suitable samples meant that the construction and initial use of the 'henge' could not be dated; however, charred hazelnut shell from the fill of the secondary feature (context 61) produced an Early Bronze Age date of 1900–1600 cal BC (Beta-117294) (see Dating section below).

Entrance Pits

Three pits were observed within the area of the northern entrance causeway into the enclosure. Two of the pits were located hard up against the edges of the droveway ditches on either side of the causeway, and bearing in mind that the trench was cut at a slight angle to the alignment of the entrance, these pits are in fact situated opposite each other at a slight angle across the entrance as defined by the ditch terminals and droveway ditches. Both of these pits (contexts 15 and 31) contained clear evidence that they held circu-

Fig. 5.10. East entrance post pit socket.

lar timbers with diameters around 0.3m, although no evidence of the timbers themselves survived. The pits were broadly circular in shape measuring up to 1.3m wide (Table 5.2). Within the centre of these u-shaped pits was a socket (Fig. 5.10), each with a rim of packing stones still in position, with an internal diameter measuring 0.3m, that had evidently held a post. The sockets had a maximum depth of 0.5m below the archaeological horizon which, together with the topsoil above, would have given a maximum depth of 0.9m below ground. Therefore, it can be inferred that these substantial entrance posts originally stood around 2m or more above ground if it is assumed that one quarter to a third of the upright was placed below ground. When the position of these post pits is considered, together with their duplication in structural form, it is difficult to view them as anything other than pits for two entrance posts situated 6m apart, one either side of the entrance causeway, perhaps forming part of a gate-type arrangement controlling passage into the enclosure from the droveway. Both pits also had evidence for a ramp running down into the socket which may have resulted from the erection of a timber that was slid into the pit, or perhaps from the extraction of the timbers. As no post-pipes could be observed in the pit fill, despite the survival of the post-sockets at the base, it seems that the posts were deliberately extracted at some point.

The third pit (context 17) was located in the centre of the gap between the two post pits immediately inside the entrance causeway and this positioning is probably important for understanding its dating and significance. Potentially it could be associated with the Early Neolithic activity on the site but its position, centrally located inside the entrance causeway, hints more towards an association with the enclosure. This sub-circular pit was slightly larger than the post pits, having a diameter averaging 1.4m across, but it was more shallow, having a maximum depth of 0.22m below the archaeological horizon and with no evidence for a socket or packing material. The pit contained an orange-brown loose sand and gravel fill consisting of redeposited pit upcast. The pit produced no finds or botanical remains except for the occasional tiny fleck of charred wood that could not be identified. It appears therefore, that this pit was excavated for some specific purpose and then very soon afterwards backfilled with the upcast material. Its location within the entrance to the monument suggests this pit could have been made to hold a threshold deposit containing some form of votive offering to mark passage into the monument.

'Droveway' Ditches

The two 'droveway' ditches were clearly visible in the trench on account of their lighter fills (Fig. 5.6). Both could be seen to run through the entrance causeway between the two ditch terminals where they were at their narrowest point before splaying outwards as they continued into the enclosure.

Six 1m wide sections were excavated across the east ditch, but due to bad weather only one of these sections could be completely excavated in the time available. This section was particularly revealing and showed that the east 'droveway' ditch measured 1.4m wide and had a maximum depth of 0.5m from the beginning of the archaeological horizon. This section was boxed out as the loose gravel in the lower fill suggested this was redeposited material rather than *in situ* gravel and so it was decided to extend the section in order to be sure of the stratigraphy. The section (Figs. 5.7 and 5.11) showed that this linear feature had originally been cut as a u-shaped ditch. A post socket could be clearly observed in the lower fill (context 55) reaching down to the base of the primary cut and this socket was traced in all the other part-excavated sections. Once the posts had been set in this central socket they were packed either side with the redeposited ditch upcast that consisted of orange-brown stony sand and gravel. The socket, measuring 0.1m wide, contained a very loose, light grey silt fill with some packing material that had fallen into it. After an unknown length of time the post was extracted and the ditch recut to a more shallow depth. There were no post-pipes or packing material in this homogeneous secondary upper fill (context 13) and so it does not appear to have had any associated uprights after the extraction of the initial post. This upper fill consisted of a brown loamy silt deposit with a high minerogenic content indicative of a topsoil origin. This deposit had a maximum thickness of 0.25m from the start of the archaeological horizon. The lack of siltation and the homogeneous nature of the upper fill (context 13) indicate that this deposit did not accumulate gradually as a result of silting, but rather suggests a single backfilling event. The lack of evidence for turf development between the upper fill and the original packing deposit below implies that the ditch was deliberately infilled after the extraction of the timbers. It is interesting to note that the extraction of the timbers noted in the linear ditch correlates with the suggestion of intentional extraction of the entrance posts and the infilling of the enclosure ditch. This implies that the entire 'droveway' and 'henge' complex was deliberately dismantled some time after its initial phase of use.

Five sections were cut across the west 'droveway' ditch to assess the stratigraphy (Fig. 5.7 and Table 5.2). This ditch revealed a similar structural form to the east 'droveway' ditch consisting of a u-shaped ditch with a constructional slot running continuously along its base. The slot contained a loose fill of packing stones in a grey loam matrix and had evidently held timbers. The ditch fill above the construction slot (context 11) consisted of a homogeneous light brown silty loam containing occasional fluvially rounded pebbles. The ditch measured 1.3m wide at the beginning of the archaeological horizon and had a maximum depth 0.5m, which together with the topsoil above would have given the ditch an original depth in the order of 0.9m from the ground surface. The 'droveway' ditches were well preserved in this section, unlike the sections excavated by Harding further to the north (1981, 91–3), and they have revealed clear evidence for having been the construction trenches for timber uprights that appear to have comprised a continuous wooden fence. The timbers are likely to have stood between 1.5

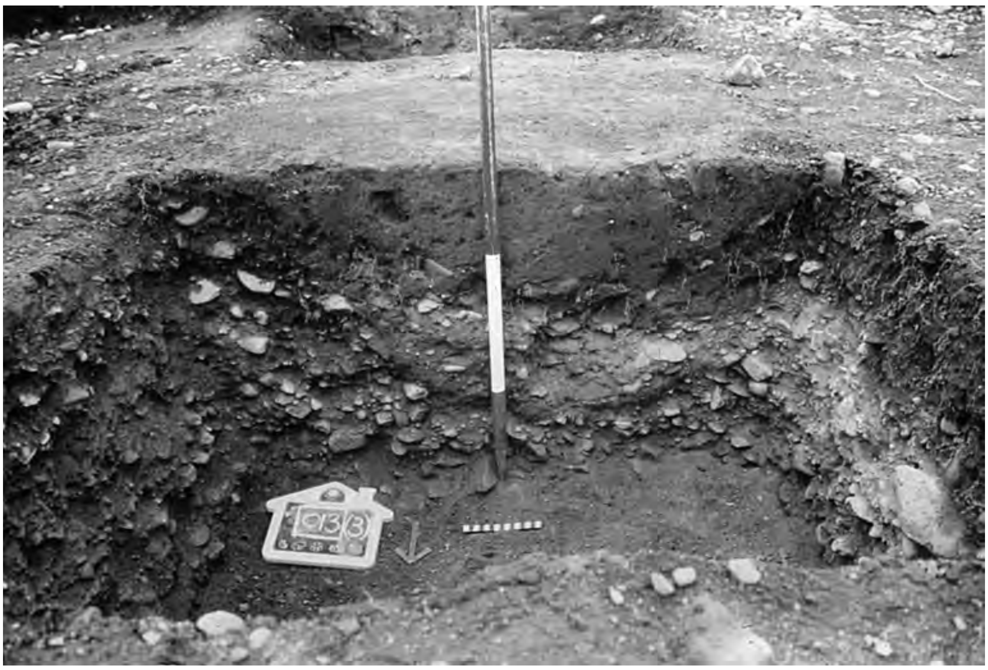


Fig. 5.11. View of east 'droveway' box section showing basal timber slot with secondary upper fill sealing the original slot.

and 2m high above ground and should therefore be thought of as a timber fence standing to head height or just above, and thus possibly able to block out peoples' view into and out of the corridor. This constructional form contrasts with that observed by Harding further to the north which consisted of shallow flat-bottomed ditches with no evidence for timber uprights (Harding 1981, 91–3), although it is possible that these sections were under-excavated as the lower ditch packing identified at Coupland consisted of the redeposited upcast, making identification of the real base of the feature difficult. Harding did not box out his sections and so the constructional form of the 'droveway' in this area is not yet satisfactorily established. In short, it is not clear whether the 'droveway' was of uniform construction along its length or whether it varied in its constructional form. Only further testing by field evaluation will settle this question and ideally this will be accompanied by the retrieval and dating of stratigraphically related organic material.

The excavation of one of the sections across the west 'droveway' ditch also revealed a peculiar deposit. This consisted of an area of *in situ* burning that contained a dark grey burnt organic fill (context 65) which produced quantities of Early Neolithic Carinated Bowl pottery (see below Fig. 5.13), three lithics (see below Fig. 5.14), a large quantity of charred hazelnut shell and charred wood and two fragments of emmer wheat chaff (see below). Radiocarbon dates from two pieces of unidentified short-lived twig charcoal produced dates in the first half of the 4th millennium cal BC, which were statistically indistinguishable from those returned from the three hearth pits (see below). This deposit was sealed by the upper fill of the 'droveway' ditch (context 13) and therefore appears to predate, or be contemporary with, the construction of the west 'droveway' ditch. However, this would make the entire monument complex extremely early, as the 'droveway' is structurally later then the enclosure – given that the 'droveway' ditches narrow to respect the enclosure entrances. It is this possibility that gave rise to understanding this monument complex from an Early Neolithic perspective (see Waddington 1997; 1999). Equally, though, an alternative explanation could hold true, but first of all the notion of residuality must be discounted; the entire deposit was *in situ*, as the surrounding gravel was fire-reddened and fused as a result of heating, and the dark burnt fill was contained within the area of burning. The deposit was not mixed or contained within other material and was not simply part of a backfill deposit but rather a discrete deposit. Therefore the other possibility is that this deposit formed part of an existing feature that was partly truncated and incorporated into the west droveway ditch during the ditch's construction. Given that the deposit has the same characteristics and the same type of fill as the other burning pits, this seems the most likely explanation at first glance. However, the sealing of this deposit by a loamy soil fill (context 11) that also filled the upper part of the west 'droveway' is indicative of a deposit that was formed during the construction of the 'droveway' ditch. It is this scenario that has been argued in previous references to this site (Waddington 1999). Too much emphasis has perhaps been placed on this context to understand the chronology of this monument. It is clearly an unusual context in an awkward stratigraphical setting and its observation on the ground left the excavator in no doubt that the material was *in situ*. At present, it can be stated that the deposit adds further to the recognition of Early Neolithic occupation of the site but the question still remains whether this included the construction of the enclosure and 'droveway' or whether these were constructed later than this deposit. This important question can only be resolved with recourse to further examination of the site, and on a larger scale. What can be said with certainty at this stage, based on the available radiocarbon dates and known tratigraphic relationships, is that the enclosure was constructed sometime between the first half of the 4th millennium and the beginning of the second millennium cal BC.

Radiocarbon Dates

by Alex Bayliss, Peter Marshall and Clive Waddington

The evaluation excavation on the Coupland enclosure produced a surprising wealth of charred organic deposits (see below) allowing samples to be submitted for radiocarbon assay from a range of features (see Table 5.3 and Fig. 5.12). The results are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). They are conventional radiocarbon ages (Stuiver and Polach 1977). The calibrations of the results have been calculated using the datasets published by Reimer *et al.* (2004) and the computer program OxCal (v3.10) (Bronk Ramsey 1995; 1998; 2000). The ranges in the table have been calculated according to the maximum intercept method (Stuiver and Reimer 1986) and are quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years. The probability distributions have been calculated according to the method of Stuiver and Reimer (1993).

Seven samples were dated at the Oxford Radiocarbon Accelerator Unit in 2001, processed according to methods outlined in Hedges *et al.* (1989), and measured using Accelerator Mass Spectrometry (Bronk Ramsey and Hedges 1997). OxA-10763, was measured as a carbon dioxide target, all other samples were converted to graphite.

Three samples were dated by Beta Analytic. Beta-117294 was measured by AMS, Beta-91629 and Beta-96130 by standard radiometric procedures.

Feature (context)	Diam (m)	Depth (m)	Description	Finds	Radiocarbon Age BP
Pit 1 (19)	0.35	0.13	Sub-circular burning pit with shallow u-shaped profile containing dark grey charred fill. *In situ* burning with heat affected edges.	Hazelnut shell Charcoal Emmer wheat Shoulderd Bowl sherds (Fig. 5.13)	4880±45 4910±40
Pit 2 (21)	0.45	0.15	Sub-circular burning pit with shallow u-shaped profile containing dark grey charred fill. *In situ* burning with heat affected edges.	Hazelnut shell Charcoal Emmer wheat Barley Shouldered Bowl sherds (Fig. 5.13)	5060±60
Pit 3 (27)	0.3	0.13	Sub-circular burning pit with shallow u-shaped profile containing dark grey charred fill. *In situ* burning with heat affected edges.	Hazelnut shell Charcoal Emmer wheat Shouldered Bowl sherds (Fig. 5.13)	5090±60 4635±70
In situ Burning Deposit (65) West Droveway Ditch			Burnt deposit in side of west droveway ditch comprising dark grey charred fill. *In situ* burning with heat affected edges.	Hazelnut shell Charcoal Emmer wheat Shouldered Bowl sherds (Fig. 5.13) Flints (Fig. 5.14)	4950±70 5040±70 4895±45 4895±40
Post Pit (31)	1.3	0.5	Circular pit with steep sides and post socket and extraction ramp surviving in base. Filled by redeposited orange-brown sand and gravel upcast and packing, ring of packing stones visible.		
Post Pit (15)	1.25	0.55	Circular pit with steep sides and post socket and extraction ramp surviving in base. Filled by redeposited orange-brown sand and gravel upcast and packing, ring of packing stones visible.		
Threshold Pit (17)	1.4	0.22	Sub-circular u-shaped shallow pit with steep sides containing redeposited orange-brown sand and gravel upcast.	Occasional charcoal fragments	

Table 5.2. Summary of pit characteristics from the Coupland 'henge' site.

Context	Material	Lab No	Radiocarbon Age BP	^{13}C (‰)	Calibrated Date (95% confidence)
Deposit in west droveway fill (context 65)	Charcoal	Beta-96129	5040±70	-25.0	3960–3650 cal BC
Deposit in west droveway fill (context 65)	Charcoal	Beta-96130	4950±70	-25.0	3940–3630 cal BC
Deposit in west droveway fill (context 65)	Hazelnut shell	OxA-10636	4895±45	-25.9	3770–3540 cal BC
Deposit in west droveway fill (context 65)	Hazelnut shell	OxA-10637	4895±40	-23.9	3770–3530 cal BC
Pit 3 (context 27)	Hazelnut shell	OxA-6832	5090±60	-22.4	4040–3710 cal BC
Pit 3 (context 27)	Charred residue	OxA-10763	4635±70	-29.0	3640–3100 cal BC
Pit 2 (context 21)	Hazelnut shell	OxA-6833	5060±60	-22.3	3990–3700 cal BC
Pit 1 (context 19)	Hazelnut shell	OxA-10638	4880±45	-23.0	3760–3540 cal BC
Pit 1 (context 19)	Hazelnut shell	OxA-10692	4910±40	-22.7	3780–3640 cal BC
Deposit cut into secondary fill of enclosure ditch	Hazelnut shell	Beta-117294	3430±60	-23.7	1900–1600 cal BC

Table 5.3. Radiocarbon dates from the Coupland evaluation.

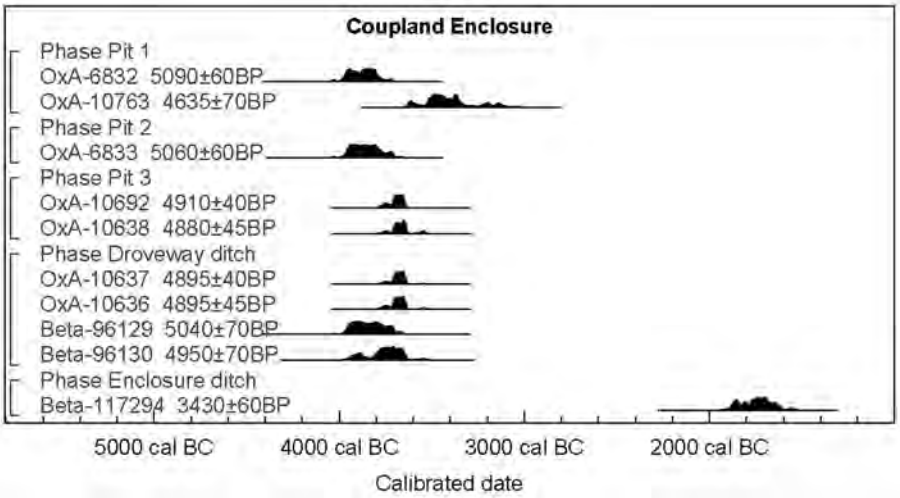


Fig. 5.12. Calibrated dates from the Coupland Enclosure.

The four results from the Droveway ditch deposit (context 65) are statistically consistent (T′=3.9; T′(5%)=7.8; ν=3), and suggest that the deposit was formed in the second quarter of the fourth millennium cal BC. The consistency of the results also suggests that the unidentified charcoal dated by Beta Analytic Inc probably consisted of short-lived material.

The two results from pit 3 are also statistically consistent (T′=0.2; T′(5%)=3.8; ν=1), and suggest that the deposit in this pit is broadly contemporary with that from the Droveway ditch. OxA-6833 is also consistent with activity during this period. The two results from pit 1, however, are statistically significantly inconsistent (T′=24.1; T′(5%)=3.8; ν=1). The carbonised residue on the shouldered bowl pottery is rather later than the activity dated by the charred hazelnut and provides an anomalously late date for Carinated Bowl pottery. Therefore, it is highly unlikely that the hazelnut is residual, rather that the date from the carbonised residue does not reflect the actual date of use or deposition due, presumably, to distortion from chemical processes.

No material was recovered that could directly date the construction of the enclosure/'henge', as the basal ditch silts contained no organic material or *in situ* finds from the ditch construction. However, the pit feature cut into the secondary ditch fill (context 61) did contain fragments of charred hazelnut. A single measurement on a fragment of hazelnut provides a calibrated date of 1900–1600 cal BC (Beta-117294; 3430±60 BP). The stratigraphic relationship of this deposit with the enclosure ditch shows that it is later than the construction of the monument complex. Therefore, together with the dates from the pre-enclosure phase of Early Neolithic settlement activity, these dates bracket the construction and primary use of this monument sometime between the Early Neolithic and Early Bronze Age, but just at what time during this two-millennial span remains unknown. This question, critical to understanding the Neolithic and Early Bronze Age of the Milfield Basin, has to be a key research priority for any future archaeological work in the area.

Small Finds

Pottery
by Alex Gibson

Thirty two sherds of Neolithic pottery were recovered from the site. These include ceramics from an unstratified context (context 1), three pit groups (contexts 19, 21 and 27), and a context within the fill of the droveway (contexts 11, 13 and 65). The pottery was laid out on a white surface in good daylight and sherds allocated to vessel groups. Some refitting was possible and this was done using HMG adhesive. The fabrics were examined macroscopically and no microscopic analysis was undertaken. Much of the material is fragmentary and abraded.

Fabric

The fabric of these groups is macroscopically similar, with small to medium angular stone inclusions. Grain and/or seed impressions are visible in the fabrics or surfaces of Nos 9 and 13. The fabric is generally hard and well-fired though often abraded. The black cores and blotchy surfaces are indicative of short but efficient open firings and the presence of join voids within the breaks indicate the method of manufacture. Surfaces are often burnished, and short horizontal to diagonal narrow burnishing facets are visible on both internal and external surfaces.

Form

The vessels all represent slack-shouldered Carinated Bowls of the Early Neolithic (Fig. 5.13). Rim forms are invariably simple or everted and are irregular in profile. The irregular folded-over rim of No. 7 is typical in this respect and such variation warns against overly rigorous typologies based on such features. The sharpest shoulder carination is to be found on

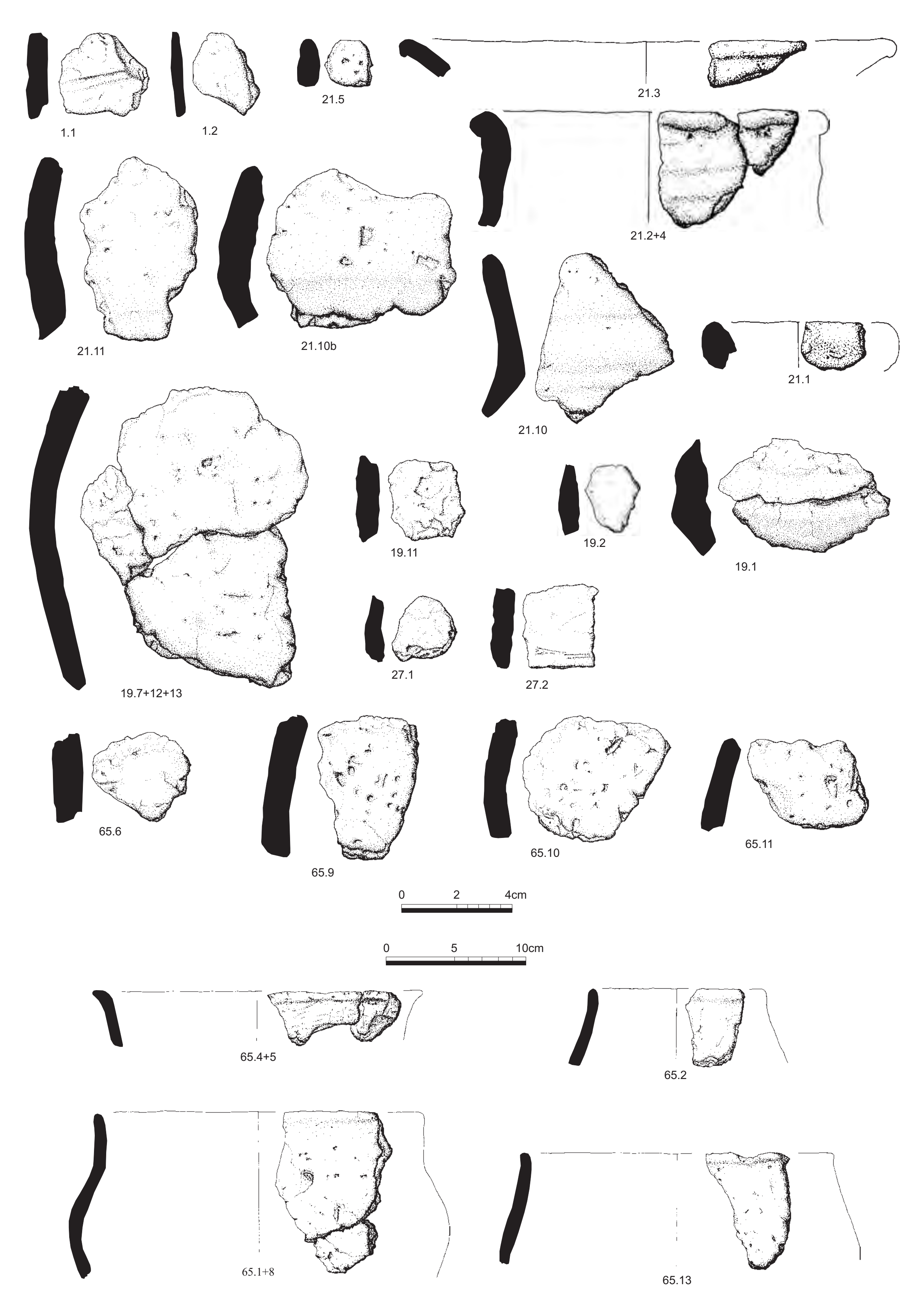


Fig. 5.13. Early Neolithic pottery from Coupland.

vessel 4, but even this is rounded. It appears that slack, 'S'-profiled open bowls are represented, with none of the sharply Carinated Bowls typical of the earliest Neolithic elsewhere. However, this may be a misleading typological assumption as the secure radiocarbon dates associated with these slack-shouldered vessels are some of the earliest dates for Carinated Bowls anywhere in the British Isles.

Numbers

In an assemblage with such homogeneous fabrics, and amongst open-fired ceramics, the surfaces of which can vary greatly in colour, the estimation of minimum numbers is always difficult. However, no cross-context joins could be detected, while some other sherds within each context group were found to join with associated material. The largest number of joins to have been identified is in No.13 where 5 of the 9 sherds can be seen to join with one another. Nevertheless, less than a quarter of this vessel is present. It is likely that 13 different pots are represented from the 7 contexts. Contexts 1, 11, 13, 19 and 27 each produced sherds from a single vessel while context 21 produced sherds from five vessels, and three vessels were represented by the sherds from context 65.

Ceramics Discussion

The pottery forms a homogeneous assemblage of Early Neolithic shouldered bowls akin to the Grimston Ware tradition associated with the long barrows of Yorkshire. It is comparable to similar material from Yeavering (Hope-Taylor 1977; Ferrell, 1990), Thirlings (Miket 1976), Yeavering henge (Harding 1981), Woodbridge Farm (Waddington 2000), Bolam Lake (Waddington and Davies 2002), Cheviot Quarry (Johnson and Waddington in press) and Broomridge (Newbiggin 1935).

With the exception of some of the vessels from Thirlings, most of this material is characterised by somewhat slack profiles and by rather elongated necks. The rim types are everted and often folded over. More importantly they are irregular in profile, warning of the dangers of over-rigorous typologies when dealing with hand-built material (Gibson 1999). With the recent recovery of more Carinated Bowl pottery with sharp carinations from the sites at Cheviot Quarry (Johnson and Waddington in press) and Lanton Quarry (Waddington 2007b), it appears that the earliest Neolithic pottery from Northumberland is more varied than the sharply carinated internally fluted bowls that seem to characterise the earliest assemblages of Neolithic pottery in southern England as defined by Herne (1988).

The grain impressions in Nos 9 and 13 are interesting given the general paucity of charred cereals from this area at this time, and similar impressions have been recognised amongst the Broomridge material. Cereals were clearly being grown in the Milfield area in the earlier Neolithic, though the extent of this arable regime is not yet clearly understood.

Finally, the material is abraded and each vessel is represented by at most a few sherds. This suggests that the contexts from which the pottery were recovered are not contexts of primary deposition but rather that the pottery had been selected from a depository elsewhere for inclusion in the pits and ditches. This seems to have been a common practice, particularly with regard to pit deposition, throughout the Neolithic.

Lithics
by Clive Waddington

A total of 14 lithics was recovered from the excavation with ten of these from the ploughsoil and four from stratified archaeological contexts. The assemblage is of interest as it contains a number of diagnostic pieces indicating the presence of Mesolithic and Early Neolithic activity on the site (Fig. 5.14). Fieldwalking of this field had previously produced evidence for Mesolithic activity including the recovery of some agate microliths (Waddington 1999). Therefore, the presence of lithics with Mesolithic affinities from within the excavated ploughzone should come as no surprise and adds support to the recognition of this area of the valley floor as having formed a focus for human activity prior to the Early Neolithic settlement activity and subsequent construction of the 'henge'. It is also of interest to note that all three of the Mesolithic pieces are made from locally occurring materials, namely agate and beach flint. This contrasts with the Early Neolithic pieces that are all made from good quality flint that has evidently been imported to the region. This finding has also been borne out through the fieldwalking survey and also by the results of excavations on other Neolithic and Mesolithic sites in Northumberland (Waddington and Davies 2002; Waddington 2007a). This suggests that Mesolithic groups tended to pursue a self-sufficient resource acquisition strategy, whereas from the very beginning of the Neolithic there was a marked shift to reliance on long-distance exchange networks for the acquisition of flint.

The variety of Early Neolithic pieces in the assemblage, including an arrowhead, scraper, and three utilised blades (all the lithics from context 65 are known to belong to the first half of the fourth millennium cal BC – see above), indicates a propensity for finished and functional tools. Most of these tools are utilised and broken, indicating the discard of used tools. Together with most of these pieces being processing tools of one kind or another, as indicated by the gloss observed on one of the blade tools (12) from the Early Neolithic deposit (context 65), this can be taken as supporting evidence for settlement-based activities. This accords well with the nature and form of the Early Neolithic archaeological features also found on

Pot No.	Context	Pot IDs	Description
1	1	1.1 1.2	Two hard and well-fired sherds with brown surfaces and a grey core. Finely crushed stone inclusions measuring up to 2mm across. Surfaces well finished and the fabric averages 7mm thick.
2	11	11.1	Single hard and well-fired sherd with a brown outer surface, grey inner surface and core. The fabric is burnished and smooth, contains finely crushed stone inclusions (<3mm) and averages 6mm thick.
3	13	13.1	Single small sherd with a black inner surface and black/brown core. The outer surface is missing. The fabric contains angular stone inclusions (<3mm). The inner surface is burnished.
4	19	19.1 19.2	Three sherds (19.1 allocated twice) two of which join to form a well-defined, slightly rounded shoulder. The two sherds may be from the same vessel despite the thinness of 19.2. This latter sherd may be from near the rim of the vessel. The fabric is hard and well-fired with brown, blotchy black surfaces and a black core. The surfaces are burnished and smooth and the fabric averages 10mm (19.1) and 6mm (19.2) thick. Coil breaks are visible in the fabric of 19.1.
5	21	21.6	Sherd in a light brown fabric with smooth burnished surfaces. From the rounded shoulder of a Carinated Bowl. The fabric averages 12mm thick and contains sparse crushed stone inclusions (<6mm). Some voids in the fabric suggest the presence of organic inclusions. Join voids resulting from coil building are visible in the fabric.
6	21	21.1 21.9	Two sherds in a hard, well-fired fabric with brown outer surfaces, a black, burnished inner surface and a black core, The fabric averages 8mm thick and contains finely crushed stone inclusions (<3mm). 21.1 Is a simple, well-defined and slightly everted rim sherd with traces of a coil break.
7	21	21.2 21.4 21.8 21.10	Four sherds, two (21.2 & 4) conjoining, in a hard, well-fired fabric with a brown outer surface, black inner surface and core. Both surfaces are burnished and smooth and the fabric averages 8mm thick. Join voids are visible within the thickness of the pot and ridges on the surfaces indicate individual coils. The fabric contains crushed stone inclusions up to 3mm across. The rim is everted and externally folded over. There are horizontal burnishing facets on top of the rim.
8	21	21.3 21.5	Two sherds in a hard, grey, well-fired fabric with angular stone inclusions up to 3mm across. The fabric is fine and averages 6mm thick. The rim is everted, and folded over externally. The profile of the rim is irregular.
9	21	21.7 21.11	Two sherds in a grey-brown fabric with black core. The larger (21.11) has a slightly sinuous profile suggesting a slack-profiled Carinated Bowl. The fabric averages 9mm thick and contains crushed stone inclusions measuring up to 3mm across. There are seed impressions (including what appears to be charred grain) in the fabric of the vessel.
10	27	27.1 27.2	Two sherds, probably from the same vessel, in a dark, hard and well-fired fabric with crushed stone inclusions measuring up to 3mm across. The surfaces are wiped and the fabric averages 7mm across.
11	65	65.4 65.5	Two conjoining rim sherds in a hard, well-fired and highly burnished fabric. Narrow horizontal to diagonal burnishing facets are particularly visible on the outer surface. The fabric is dark grey-brown throughout though the top of the rim is a lighter brown. The rim is everted and externally pointed. The fabric averages 10mm thick and contains crushed stone up to 5mm across. Join voids are visible within the fabric.
12	65	65.3 65.11	Two sherds in a light brown fabric with grey core. The fabric averages 9mm thick, contains finely crushed stone (<3mm) and is hard and well-fired. The outer surface is smooth and the abraded remains of burnishing facets are visible on the inner surface. The rim is everted and the shoulder very slack to non-existent. Join voids are visible within the fabric.
13	65	65.1 65.2 65.6 65.7 65.8 65.9 65.10 65.12 65.13	Nine sherds, many conjoining to form a large, round-based S-profiled bowl with slack carination. The fabric is grey-brown throughout, averages 10mm thick and contains large crushed stone inclusions up to 7mm across. The upper third of the pot is burnished inside and out, but the lower portions are less well finished. The rim is everted but quite simple. There are grain impressions within the fabric and preserved in the surfaces of the pot.

Table 5.4. Catalogue of pottery from the Coupland site.

Fig. 5.14. Chipped stone lithics from Coupland.

the site. There were, however, no lithics indicative of Late Neolithic/Early Bronze Age activity, although this does not mean that the enclosure/'henge' was not constructed and/or used during this period.

Catalogue

Topsoil (context 1)

1. End scraper made from dark grey high-quality flint. It is made on a blade with abrupt retouch around its distal end and edge trimming along one of its long sides. There is edge damage along the retouched end indicating that it has been used. The piece has maximum dimensions of 44mm long by 23mm wide by 7mm thick. Artefact type and manufacturing tradition characteristic of the Early Neolithic (illustrated Fig. 5.14).
2. Broken utilised blade segment made from light grey speckled high-quality flint. Edge trimmed along one of the long edges and evidence of utilisation along the other sharper edge. Narrow parallel-blade removal scars are evident on the dorsal surface, indicating this piece is the product of a blade technology typical of Early Neolithic manufacturing traditions (illustrated Fig. 5.14).
3. Broken blade segment made from a coarse dark grey flint, possibly of glacial origin and which may have been heat affected. The piece has a triangular section with a blade removal scar on its dorsal surface. This blade technology is again typical of Early Neolithic manufacturing traditions (illustrated Fig. 5.14).
4. Broken leaf-shaped arrowhead, made on a blade, from flint that has been subsequently burnt. Unifacial retouch on the dorsal side consisting of invasive retouch to shape and sharpen the piece. Artefact type and manufacturing tradition diagnostic of the Early Neolithic (illustrated Fig. 5.14).
5. Flake made from light grey banded flint. This piece has been chipped by recycling a previously struck flint that

was already of great antiquity when it was rechipped. This is evidenced by the remains of a patinated surface on parts of the dorsal side. It is 9.5mm long by 32mm wide by 6mm thick.

6. Small retouched cortical flake, probably used as a scraper, made from light grey beach flint. The piece is quite small and the unifacial retouch on the dorsal surface is very abrupt, suggesting this piece is more likely to be of Mesolithic than Early Neolithic date. 20mm long by 17mm wide by 10mm thick (illustrated Fig. 5.14).
7. Small flake made from light grey flint, 28mm long by 14mm wide by 6mm thick.
8. Narrow blade made from red agate. Some possible utilisation along one edge and of microlithic proportions. Mesolithic affinities; 33mm long by 6mm wide by 4mm thick (illustrated Fig. 5.14).
9. Small broken flake of chert. Undiagnostic.
10. A microlith made from red banded agate. This unusual, pointed form has a retouch scar on its ventral surface and under a magnifying glass one of the long edges shows abrasion resulting from utilisation. Mesolithic.

In Situ Burnt Deposit in West 'Droveway' Fill (context 65)

11. A small edge-trimmed flake made from dark grey high-quality flint. The flake has a hinge fracture at its distal end with edge-trimming along the flat section. Elsewhere the flake appears to have scars from blade removals on its dorsal surface, suggesting that it was produced as part of blade-based manufacturing technology. It is 28mm long by 47mm wide by 9mm thick (illustrated Fig. 5.14).
12. Small broken utilised blade tool made from grey speckled flint. There is abrasion resulting from utilisation along both of its concave long edges. Produced as part of a blade-based manufacturing technology. An area of polish was evident on this piece suggestive of plant-processing activities (illustrated Fig. 5.14).
13. Small broken flake that appears to be heat affected. Undiagnostic.

East 'Droveway' Ditch Fill (context 13)

14. Tiny broken bladelet segment made from dark grey chert. Its microlithic size is suggestive of a Mesolithic date.

Archaeobotanical Macrofossils by Jacqui Huntley

Bulk samples of sediment (20–30 litres each) were processed by manual flotation in the laboratory with both flot and residue retained upon 500μ mesh. After sorting at magnifications of up to ×40, the flots were sorted for their charred plant remains and identifications were by comparison with modern reference material held in the Department of Archaeology, University of Durham. Nomenclature follows Stace (1977). This methodology was followed for all subsequent botanical macrofossil analyses reported in this Chapter.

Table 5.5 below presents the botanical results. Hazelnut shell fragments dominated all three samples with several hundred fragments in pit 3 (context 27). This was classed as a hearth pit and a charred hazelnut shell from it has been dated to the second quarter of the fourth millennium cal BC. Such material has been commonly recovered from a variety of Neolithic contexts in Northumberland, including the sites at Thirlings (van der Veen 1982), Whitton Hill (van der Veen 1982a), and Bolam Lake (Huntley in Waddington and Davies 2002). Of greater interest are the remains of emmer wheat and barley. The former had grains of a reasonably characteristic 'tear-drop' shape. Grain and ear fragments (glume bases and spikelet forks) of emmer were recovered and, although neither abundant nor especially well preserved, do demonstrate at least the local use, and probably processing, of this cultivated cereal. Barley grain attests use of a further cereal species, perhaps for brewing purposes.

Species	Context 17 Threshold Pit	Context 19 Pit 1	Context 21 Pit 2	Context 27 Pit 3	Context 65 Burnt droveway deposit
Corylus avellana shell (hazelnut shell)	+	+++	++	+++	++
Triticum dicoccun (emmer wheat)		2	7	2	
Triticum dicoccun glume base (emmer chaff)		96	3	1	2
Triticum dicoccun spikelet fork (emmer chaff)		78	4		
Triticum sp. (glume base)		40			
cf. *Triticum spelta* glume base (spelt chaff)		1			
cf. *Triticum* sp. (wheat grain)		3	1		
cf. *Triticum aestivum* (bread wheat)		1			
Hordeum sp. (barley grain)			2		
Cerealia indet. (indeterminate cereal grain)			4		

The hazelnut shell fragments were scored qualitatively with + representing a few fragments, ++ some 10s of fragments and +++ some hundreds

Table 5.5. Summary of botanical macrofossil results from the Coupland site.

The presence of domesticated cereals is an exciting find for this site. The radiocarbon dates are early, dating to the first half of the fourth millennium cal BC, and cover a period that has sometimes been accepted as simply non-agricultural in northern England. Whilst there is no conclusive evidence from such a small assemblage for local production, it seems reasonable that the cereals were most likely being cultivated within the local vicinity of the Till valley – chaff is present although emmer, being a glume wheat, could have been transported as spikelets, with final processing at the site of consumption. Given the numbers of glume and spikelet fragments in pit 1 (context 19) it is obvious that considerable quantities of emmer were at least being processed here. Weed seeds would have enabled better discussion of this matter. On the other hand there is good pollen evidence for cereals in the Early Neolithic from the Northumberland sites at Broad Moss (Davies and Turner, 1979) and Trickley Wood (Turner, 1968) where, in the case of the latter, cereal type values reached an amazing 1.4% total dry land pollen during the 3800–3300 cal BC period as interpolated by Pratt (1996).

Where there are high cereal pollen values there are large amounts of cereals being grown, or just possibly only processed, since pollen grains stick to the ears of corn and are only dispersed short distances from the fields in which they are being grown. It therefore seems highly likely that the Milfield Basin was an important cereal-producing area in northern England during the Early Neolithic.

Pollen
by Fay Davies, Clive Waddington and Jacqui Huntley

Samples from five contexts were submitted for pollen analysis. Those from pit 1 (context 19), pit 3 (context 27) and the burnt deposit in the west 'droveway' ditch fill (context 65) were found to be non-polleniferous although charcoal was found in abundance in these deposits. Two contexts did produce pollen in sufficient quantity to allow assessment. These were the upper fill of the west droveway ditch (context 11) and the fill of the pit cut into the secondary fill of the 'henge' ditch (context 61).

From the tree pollen percentages alone it is clear that the vegetation represented by these two assemblages is very different. The upper fill of the west droveway ditch (context 11) contains over 40% tree/shrub pollen – alder and hazel predominantly – whilst the secondary pit (context 61) contains only just over 6%. The ditch also has a variety of herb types as well as moderate amounts of grasses and sedges. The indeterminate categories are predominantly 'covered' which simply indicates that the slides contained rather a lot of debris, perhaps being rather thick too. In comparison the indeterminate category best represented in the enclosure ditch deposit is 'decomposed' thus almost certainly reflecting poor preservation conditions within that ditch – possibly periods of alternating wet and dry. This poor preservational state is also indicated by the relatively high values of Compositae (Liguliflorae) types which are characteristic and easily recognised even when highly degraded. The wider range of herb types in context 11 probably reflects better preservational conditions too. Depending upon the nature of the matrix material these pollen data suggest that probably scrubby woodland was not far away when the droveway ditch deposits accumulated, but that significant clearance had occurred by the time that the secondary pit was filled in. It could therefore be argued that the features are not contemporary and this is supported by the radiocarbon dating and stratigraphic sequence of the site (see above).

Discussion

The Neolithic archaeology of the Milfield Basin is a subject of importance both regionally and nationally as it forms a key foci forNeolithic settlement in the British Isles. The information yielded by the Coupland evaluation is important for enhancing our understanding of Neolithic settlement, subsistence strategies, material culture and also the form and sequence of the Coupland complex itself.

The archaeological sequence identified by this excavation reveals a long history of human activity on the site which can be summarised as follows:

Species	Context 11 Upper fill of west droveway ditch	Context 13 Upper fill of east droveway ditch	Context 17 Threshold Pit	Context 19 Pit 1	Context 61 Pit cut into 2ndry fill of 'henge' ditch	Context 65 Burnt droveway deposit
Corylus avellana (hazel)	?	?	+	+++		+++
Alnus (alder)					+	

The charred wood fragments were scored qualitatively with + representing a few fragments, ++ some 10s of fragments and +++ some hundreds

Table 5.6. Summary of charred wood results from the Coupland site.

Species	Context 11	Context 61
Trees, Shrubs and Dwarf shrubs		
Betula (birch)	4.23	0.46
Pinus (pine)	1.32	0.92
Ulmus (elm)	0.79	0
Quercus (oak)	1.06	0.46
Alnus (alder)	18.25	1.83
Ericaceae (heather)	0.26	0.46
Corylus (hazel)	14.55	2.29
	40.46	6.42
Herbs		
Caryophyllaceae (carnation family)	0.26	2.75
Chenopodiaceae (family of herbs)	0.26	1.83
Anthemis (chamomile)	0.79	0.46
Succisa (Devil's bit, scabious)	1.06	
Gramineae <40µ (grass)	11.64	10.09
Gramineae >40µ (cereal)	0.26	0.46
Compositae (Liguliflorae) (dandelion)	0.79	14.22
Papavar (poppy)	0.26	
Plantago lanceolata (ribwort plantain)		0.46
Thalictrum (common meadow rue)	0.26	
Potentilla erecta (tormentil)	0.26	
Galium (bedstraw)	0.26	
Cyperaceae (sedge family)	18.52	35.78
Ferns		
Filicales (fern family)	0.53	4.59
Polypodium (polypody fern)	1.85	3.67
Aquatics		
Sphagnum (bog moss)		0.46
Menyanthes (bog-bean)	0.26	
Myriophyllum alterniflorum (water milfoil)	0.79	
Myriophyllum spicatum (spiked water-milfoil)		0.46
Indeterminate: Decomposed	1.59	13.76
Indeterminate: Covered	12.43	0.46
Indeterminate: Folded	7.41	4.13

Table 5.7. Summary of pollen results by % abundance from the Coupland site.

1. Mesolithic activity as represented by the lithics recovered during fieldwalking, and which includes microliths made from locally occurring agate.
2. Early Neolithic burning/hearth pits, indicative of settlement activity (whether permanent or transient), containing evidence for pottery use, food preparation and consumption, imported flint, cereal cultivation and gathered resources.
3. Construction of the monument complex which included a 'henge'-type enclosure.
4. The construction of a 'droveway' with timber fencing for at least part of its course, which may have been built as part of the enclosure complex or at some time after, but at a time when the banks were still standing.
5. Abandonment of the monument complex and the deliberate partial backfilling of the enclosing ditches and removal of the 'droveway' timber fencing.
6. Re-use of the monument in the Early Bronze Age that included digging a pit into a secondary fill of the ditch and backfilling with burnt material.

The Early Neolithic pits contained domestic debris, and, with evidence for *in situ* heating, are considered to have been cooking pits indicative of settlement activity. When the Early Neolithic lithics are considered, the presence of a scraper and various retouched blade tools indicates processing activities – which are normally associated with residential sites. In addition, the pottery, wheat grains, chaff and hazelnut shells are all debris indicative of food preparation, consumption and perhaps some storage. Taken together, this structural, artefactual and ecological evidence indicates Early Neolithic settlement on this area of the gravel terrace and compares directly with the other Early Neolithic settlement evidence in the basin from Thirlings (Miket 1987), Yeavering (Harding 1981), Cheviot Quarry North and Cheviot Quarry South (Waddington 2000 and Johnson and Waddington in press), Lanton Quarry (Waddington and Johnson in press) and Whitton Park (Waddington 2006). Previous work on shouldered bowls from the basin indicated that some of the pottery was probably made from locally available clay that could be obtained from the banks of the River Till (Gibson 1986), while the grits were also of local stone. The foodstuffs for which direct evidence survives included domestic cereals as well as wild gathered resources in the form of hazelnuts. Although no bone was obtained during the excavation, as it generally does not survive in this acidic environment unless burnt, it can be inferred that the Early Neolithic communities inhabiting the basin would have also included meat and fish as an important part of the diet. Taking into account the botanical remains of hawthorn and bramble recovered from the Thirlings excavation (van der Veen 1982), the use of wild resources evidently continued to be an important practice during the Neolithic.

Although the chronology of the 'henge'-'droveway' complex is not yet established, understanding of the form of these monuments has been advanced. The enclosure consisted of an inner ditch with outer bank with two opposed entrances. The excavation over the north entrance has shown that two large posts were located either side of the entrance causeway and these may have secured some kind of gate arrangement that controlled access into the monument. The height of these posts is considered to have been higher than the timber fenced 'droveway' that leads into the monument, as the entrance pits contained considerably larger diameter timbers, although the sockets for both structures were dug to the same depth. As the entrance posts were located against the inner edges of the 'droveway' within the entrance causeway of the enclosure, these posts appear to unite the 'droveway' and enclosure in a common use suggesting these two monumental structures were in use contemporaneously, although the droveway and entrance posts need not have formed part of the original 'henge' construction. If the latter is the case then the 'droveway' may have been constructed at a later date to utilise the upstanding banks of the enclosure. Nevertheless, the fact that the 'droveway' is undoubtedly linked in some way to the Milfield South and Marleyknowe henges, which it passes along its course, as well as the Coupland enclosure, suggests this feature dates to the same broad period as these monuments rather than a substantially later one as Bradley has suggested by relating it to an early Anglo-Saxon use (Bradley 1993).

The architecture of the Coupland enclosure complex appears to have been geared towards containing and controlling people's views from within and outside this monument. Anybody standing outside the monument would be unlikely to have been able to see into the fenced corridor of the 'droveway', if indeed it was fenced along the rest of its course, nor into the enclosure, and this must have heightened the sense of separation between the onlookers and the participants in activities taking place within. This lack of visibility would have also surrounded the monument with a sense of mystery, awe, and perhaps fear, while at the same time accentuating the sense of separation and isolation when positioned within the monument. How far the timber uprights of the 'droveway' continue through the monument remains unknown until further excavation is undertaken. However, the undoubted continuation of this 'droveway' through the 'henge' indicates that even on entering the monument, passage remained strictly governed by the presence of this bounded thoroughfare and the enclosing ditch and banks beyond.

Quite what uses this monument complex was put to remains open to question. Connection with some kind of ritual seems likely given the 'droveway's' proximity to the Milfield South and East Marleyknowe hengiforms. However, the direct linkage of the monument to the crossing of the River Till to the north and the Galewood depression to the south is indicative of some kind of procession connected with access to the River Till. Who and what was included in such processions is far from clear and it has been argued previously that such processions could have included the movement of livestock as well as people (Waddington 1999). If livestock were involved this may help to make sense of why there was a timber fence and entrance posts, but this of course remains only speculative. At the same time, though, this does not preclude human use of the 'droveway'. The embedding of economic/subsistence strategies within ritual practice and pervading belief systems should not be seen as unusual or unlikely. In this way the performing of practical tasks, such as cultivating crops and herding stock, and the observation of ritual and ceremony should not necessarily be seen as mutually exclusive. Rather, it is only modern academic thought that compartmentalises the world around us into discrete realms of behaviour so that it can be comprehended in a systemic way. The reality of human behaviour does not, of course, conform to such strict division as most thought and action is interlinked and frequently interdependent. Understanding monuments such as the Coupland enclosure and 'droveway' as simply ceremonial in nature may be too rigid and over-simplistic, as such an approach fails to comprehend how belief systems transcend all aspects of life from routine chores and economic behaviour to the content and metaphor employed in ritual.

Harding (2000) has observed that the banks of the Coupland 'henge' would have framed a wide panoramic view of the north-east Cheviot range to the south, taking in Humbleton Hill in the east through to Gains Law in the west. An observer standing in the middle of the north causeway looking south through the centre of the monument would have a direct view framing Harehope Hill. Bearing in mind that all other views within the monument complex would be curtailed by the banks of the enclosure and the timber fencing of the droveway, this focus on the prominent rounded hilltops of the north-east Cheviot range would have become even more pronounced. This visual linking of the surrounding landscape into the architecture of the monument complex is also apparent in the layout and positioning of the other ceremonial monuments in the Late Neolithic-Early Bronze Age Milfield ritual complex (see Milfield North, this chapter) and this in itself provides another hint that the Coupland enclosure and 'droveway' also date to this period.

Such views of the landscape assume a relatively open environment immediately around the monument and this receives some possible support from the limited pollen results. The pollen evidence from the 'droveway' ditch fill indicated disturbed ground with an open tree cover and grassland, with indications of cultivation in the vicinity of the site but probably at a distance. This is consistent with the botanical macrofossil evidence, which suggested that cereal cultivation was taking place not too distant from the site with some processing of cereals probably occurring on site.

The deliberate dismantling of the monument complex, as suggested by what appears to be the extraction of timbers from the 'droveway' and entrance posts, and the partial infilling of the enclosure ditch before the first half of the 2nd millennium cal BC reveal a significant change in use of these monuments and the landscape in which they were situated, as well as no doubt reflecting socio-ideological transformations. Significant changes can be glimpsed elsewhere in the archaeological record at this time with the widespread construction of cairnfields and the inclusion of cup and ring marked rocks, often broken off from surrounding outcrops, into these burial locations where they were deposited with the rock art facing in towards the corpse. Purposeful deployment of cup and ring marked rocks is never encountered again in the archaeological record. Henge monuments and stone circles go out of use. In all, there appears to have been a wide ranging and profound change in landscape organisation and ideology reflected in the abandonment, even dismantling, of the ritual complex. By the time the burning pit was cut into the secondary infill of the Coupland enclosure ditch, *c*.1900–1600 cal BC, the monument complex no longer looked the same and neither was it used in the same way as before. In short, the longstanding importance attached to this place in the landscape had waned and a new socio-ideological order emerged that had no need for the ritual complex or for Beaker burials for that matter. What was intelligible to the generations of henge builders no longer held such resonance in the minds of the Bronze Age communities who chose instead to order the landscape through partition and permanent settlements (e.g. Houseledge, Lookout Plantation) with associated paddocks and field systems, some of which can still be seen as upstanding monuments in the Cheviot Hills (see Chapter 4).

MILFIELD NORTH BOUNDARY FEATURE AND PITS

Introduction

The Milfield North boundary survives as a cropmark; it is visible as a linear feature that forks at its west end (Fig. 5.15) and it is situated in the same field as the Milfield North henge and double pit alignment and part of the Whitton Hill ring ditch cemetery (Miket 1985). It was not known whether this linear feature was natural patterned ground or archaeological in origin and so it was decided to test this by excavation. The site lies at NT93353505 on the flat raised fluvio-glacial sand and gravel terrace at 38m OD on the valley floor. It is situated above the alluvial floodplain on well draining ground free from flood risk. The River Till, which lies only a few hundred metres away to the east of this field, is not visible from the terrace as it is inset below the steep scarp of the terrace edge within the alluvial sediments of the floodplain. The soil cover on the terrace consists of a gleyic argillic brown sand (Payton 1980) with the topsoil being a

Fig. 5.15. Aerial photograph showing the Milfield North boundary feature.

moderately stony sandy loam. These soils are attractive for agriculture and currently support a rotating cycle of winter wheat followed by livestock grazing. This area of the terrace has a wealth of archaeological remains associated with it. Previous fieldwalking on this field produced a high density of lithics (Waddington 1999, 60) with most of those that could be classified belonging to the Mesolithic. All the cropmark sites in this field have been partially excavated and, together with those investigated for this study, form an important complex of Late Neolithic/Early Bronze Age ceremonial monuments and later field system at the northern entrance into the Milfield Basin.

Excavation

A single evaluation trench measuring 9.75m by 7m was laid out over a section of the linear ditch feature towards its west end (Figs 5.16–5.18). The modern turf and topsoil were removed by machine and the remaining contexts cleaned and excavated by hand (Fig. 5.19). The topsoil has been systematically ploughed so any archaeological remains within this horizon have been obliterated. On cleaning back, a section of the linear ditched feature was revealed together with two pits, both lying hard up against the ditch edge on its north side. An agate flake was recovered from the spoil heap during removal of the ploughsoil. This piece is small and broken but appears to have blade removal scars on its dorsal side. The piece is undiagnostic. The topsoil consisted of a brown stony sandy loam averaging 0.3m deep. This lay directly on the sand and gravel substratum into which the archaeological features were cut.

Features

Linear Ditch

The linear ditch varied in width from 3 to 4m in the exposed area; it was narrower at its west end and widest at its east end. Two sections were cut across the ditch, revealing a broad shallow ditch with a flat base and concave sides giving an elongated u-shaped profile. It had a maximum depth of 0.25m below the archaeological horizon. It contained no evidence of

Fig. 5.16. Milfield North boundary feature location plan.

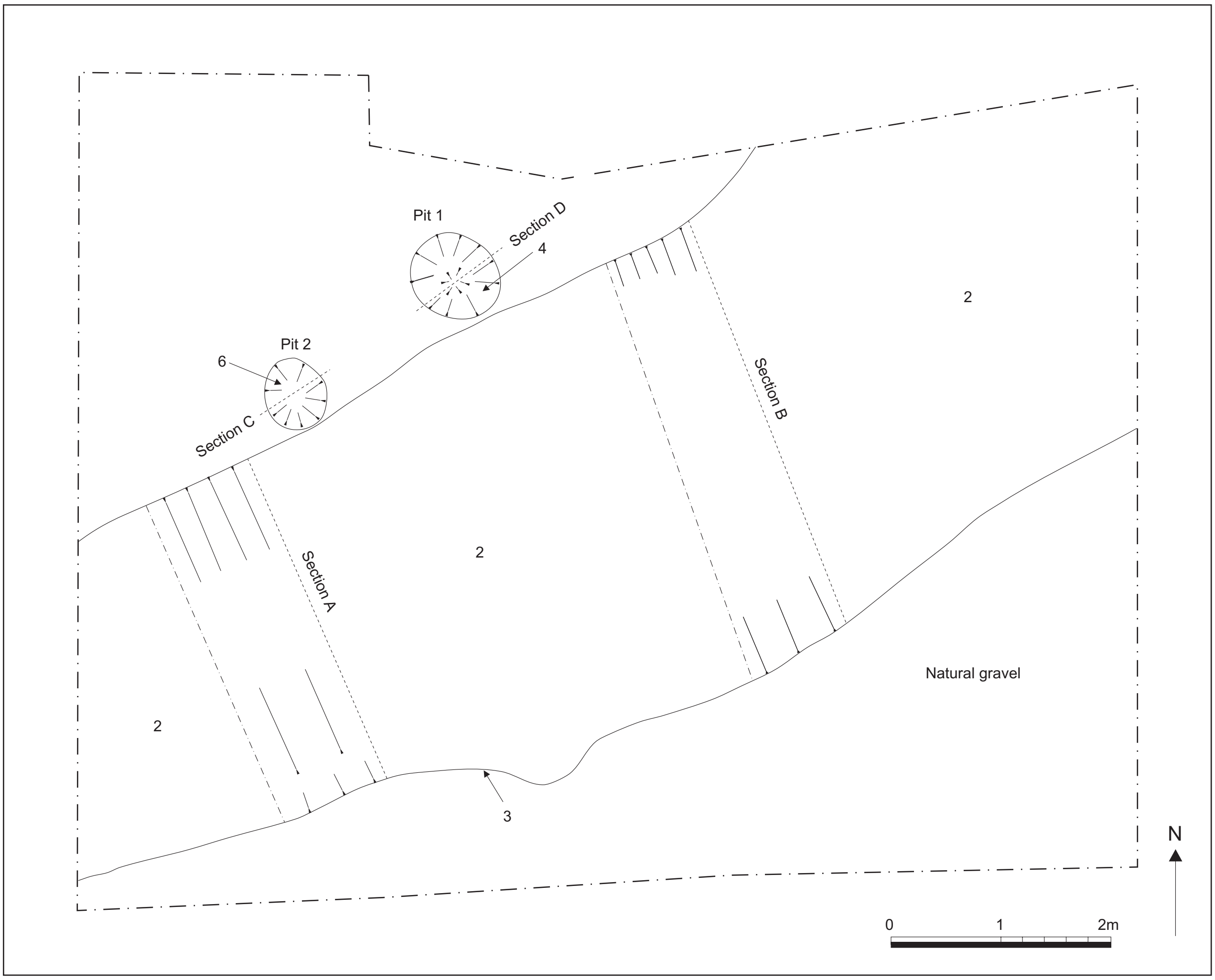


Fig. 5.17. Milfield North trench plan.

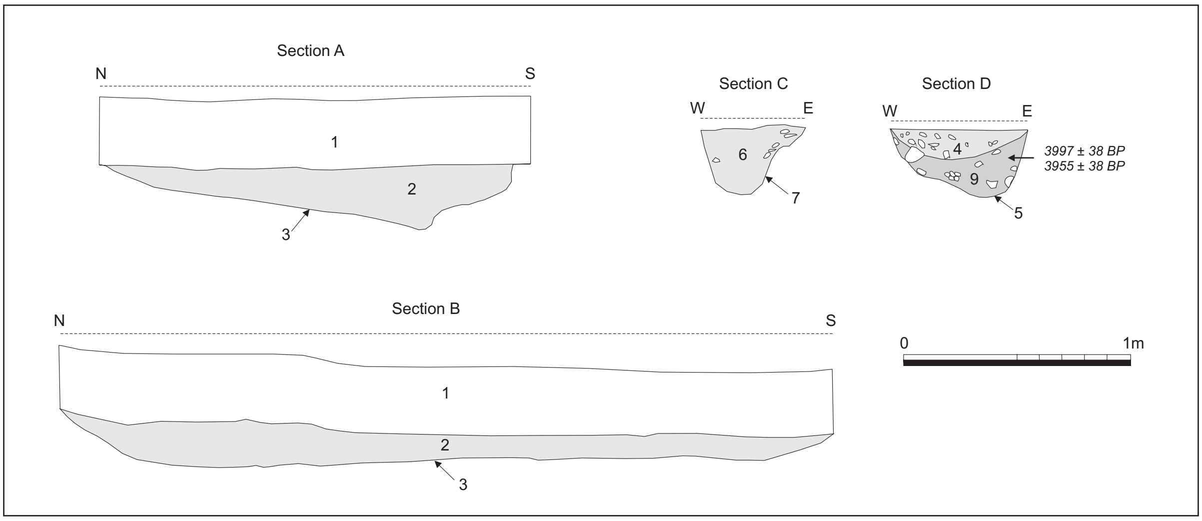


Fig. 5.18. Milfield North section drawings.

Fig. 5.19. Milfield North excavation trench after initial cleaning with boundary feature running through and the dark fill of the Late Neolithic pit showing clearly against the sand and gravel substratum.

having contained structural features and no recuts were evident. As the sand and gravel terraces are a stable geomorphological unit it is likely that the depth of topsoil has not changed significantly since antiquity. Therefore, the depth of the ditch from the ground surface when originally cut was probably in the order of 0.55m. The entire fill of both sections was hand-sieved through a 5mm mesh to recover any artefact or dating evidence. Four undiagnostic agate flakes and a possible quartz flake were recovered (see below) but no dating evidence. These finds are almost certainly residual and do not relate to the use of the ditch. The fill (context 2) consisted of redeposited sand and gravel that was more loose and sandy than the surrounding substratum into which it was cut. The fill was homogeneous and there was no evidence of gradual siltation in the section but rather that it had been backfilled as a single event.

Pit 1

A circular pit filled with dark material with a high charred material content was excavated on the north side of the ditch (Fig. 5.20). The pit was excavated by half-sectioning, and then removal of the remaining half of the fills. The pit measured 0.69m by 0.82m and had a depth of 0.33m from the beginning of the archaeological horizon, although when the depth of the topsoil is added this would give an original depth somewhere in the region of 0.65m. The surviving pit deposit contained two distinct fills, an upper dark grey-brown fill (context 4) and a lower light brown-grey fill (context 9). The upper fill had a loose consistency and contained rounded pebbles averaging 0.04m across, making up *c*.25% of the fill. The lower fill was a loose sandy silt containing rounded pebbles between 0.04m and 0.2m across, which also constituted *c*.25% of the deposit. The cut recorded in the section drawing (Fig. 5.18) showed that the pit did not have an even profile as it had a slight step on its south side before dropping down to a lower hollow on the north side. No recut was observed and no post-pipe was visible. The fills were horizontally bedded and appear to have been deposited in the pit as part of the same backfilling event. No siltation or weathering of the fills was evident, indicating that the pit had not been left open for any length of time after it was initially dug.

Both fills contained sherds of Grooved Ware pottery, flints and tiny fragments of burnt bone together with charred hazelnut fragments and charred wood. The burnt bone was too small to identify but it is possible they may be the remnants of a cremation – most of which has been lost in the truncated upper fill of the pit, as was thought to be the case with the burnt bone found in pits forming part of the Milfield North double pit alignment elsewhere in this same field (Harding 1981). A total of three pottery sherds were recovered from the upper fill (context 4) together with seven flints (see below Fig. 5.22). The lower fill (context 9) produced 31 pottery sherds and six flints (see below Fig. 5.22). Both fills were environmentally sampled and produced hazelnut shell, hazel and birch charcoal together with an elder seed (see below). Many of the Grooved Ware sherds had been placed flat against the base or the sides of the pit, indicating intentional placement of some of the ceramics and not simply a random dump. This instance of apparent 'structured deposition' echoes the situation at Thirlings where a clay-lined pit had Impressed Ware pottery pressed into the clay lining (Miket 1987). Two radiocarbon measurements on charred wood from the lower fill of this pit are statistically consistent (T′=0.6; T′(5%)=3.8; ν=1), and provide a date in the mid third millennium cal BC for the pit and associated Grooved Ware which corresponds with dates produced for Grooved Ware elsewhere in England.

Pit 2

A second pit, also sub-circular in plan, was identified 1m to the southwest of pit 1. The pit measured 0.48m by 0.64m across and had a maximum depth of 0.31m from the beginning of the archaeological horizon, suggesting an original depth similar to that of pit 1. This pit had a single homogeneous fill (context 6) consisting of a loose orange-brown sandy gravel with small rounded pebbles making up *c*.5% of the deposit.

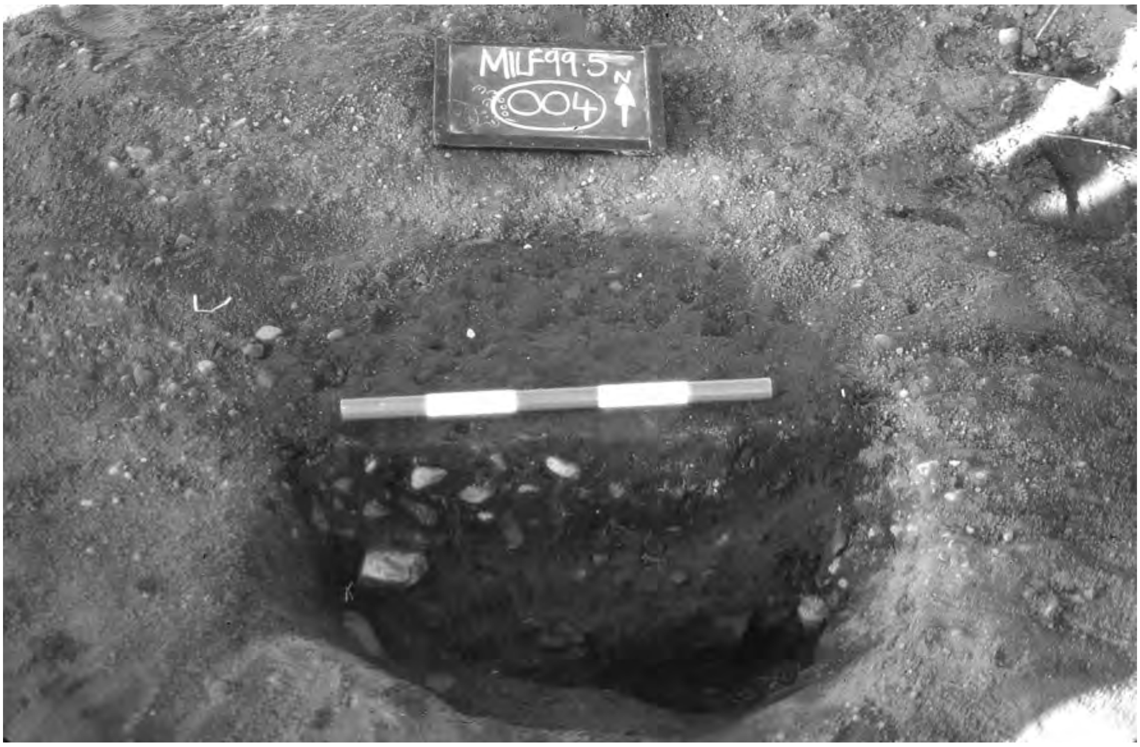


Fig. 5.20. Section through pit 1 at Milfield North. Scale = 0.5m.

Context	Material	Lab No	Radiocarbon Age BP	$\delta^{13}C$ (‰)	Calibrated date (95% confidence)
9 Lower fill of Pit 1	Hazelnut shell	OxA-10634	3997±38	-24.9	2620–2450 cal BC
9 Lower fill of Pit 1	Hazelnut shell	OxA-10635	3955±38	-23.2	2570–2340 cal BC

Table 5.8. The radiocarbon dates from Milfield North pit 1.

The section across the pit showed that the pit had an irregular profile with a steep west side and a step in the profile on the east side. It was considered that this pit may have held a post but there was no evidence of a post-pipe in the section.

There was no direct stratigraphic association between either pit 1, pit 2 or the linear feature. However, the position of the two pits, both of similar dimensions, along the north edge of the linear feature may be meaningful. It is possible that further pits may exist in association with the linear feature but further fieldwork will be necessary to establish this.

Radiocarbon Dates

by Alex Bayliss, Peter Marshall and Clive Waddington

The excavation on the Milfield North site produced a quantity of charred hazelnut shell from both the upper and lower fills of pit 1 (contexts 4 and 9 respectively). As the lower context was sealed by the upper fill, and had therefore not been disturbed or truncated, it was decided to submit two hazelnut shells from this lower fill for radiocarbon dating.

The samples were dated at the Oxford Radiocarbon Accelerator Unit in 2001, processed according to methods outlined in Hedges *et al* (1989), and measured using Accelerator Mass Spectrometry (Bronk Ramsey and Hedges 1997).

The two dates from the pit are statistically consistent (T′=0.6; T′(5%)=3.8; ν =1), and provide a date in the mid third millennium cal BC for the pit and associated Grooved Ware. This dating is important as it is earlier than the dates for the Milfield North henge and double pit alignment (see Harding 1981) and the Whitton Hill hengiform (Miket 1985) in the same and adjacent fields (see Fig. 5.21). The likelihood is, therefore, that this pit deposit is the earliest component so far recognised in the Late Neolithic-Early Bronze Age Milfield North ritual complex, suggesting that there was a protracted history of ritual activity in this area with some activity pre-dating the henge deposits. There appears to be evidence for use of

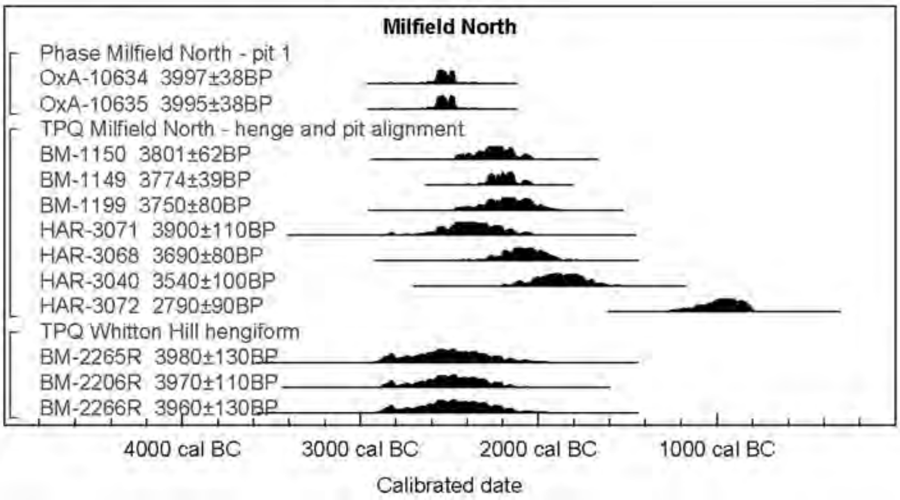


Fig. 5.21. Calibrated dates for the Milfield North pit and the other nearby sites including the Milfield North henge, double pit alignment and the Whitton Hill hengiform.

this complex spanning up to several hundred years, starting in the Late Neolithic in the second half of the 3rd millennium cal BC and continuing into the Early Bronze Age during the early 2nd millennium cal BC. There are conspicuously few radiocarbon dates associated with Grooved Ware pottery from northern England and particularly so in the case of Northumberland. The mid 3rd millennium cal BC date from the Milfield North assemblage corresponds with the date ranges for Grooved Ware elsewhere in the British Isles. The only other dates associated with Grooved Ware in Northumberland that are currently available are those from Cheviot Quarry (Johnson and Waddington in press), which date to the first half of the third millennium cal BC (2920–2760 cal BC, 2890–2630 cal BC, 2880–2600 cal BC and 2880–2570 cal BC).

Small Finds

Pottery
by Alex Gibson

Introduction

Fifty seven fragments of pottery were submitted for analysis. The material was derived from the upper (context 4) and lower (context 9) fills of pit 1. Six fragments came from the upper level. The sherds were laid out according to context and then by fabric group and individual vessels. One sherd from the upper fill was found to conjoin with a sherd from the lower level and three other vessels comprise sherds from both levels. Accordingly, the material was treated as a single assemblage. The pottery was examined macroscopically with the aid of a ×10 hand lens. No microscopic analysis has been undertaken. Consequently, the fabric groups identified here are tentative, pending more scientific analysis. Joining sherds were refitted using HMG adhesive.

Description of the Assemblage

Seventeen vessels have been recognised in this assemblage plus two small fragments of burnt pottery or fired clay (P18). Each vessel is represented by a small proportion of the original whole, often a single sherd, and no vessels are reconstructable, even in profile. The sherds are all abraded.

Three fabric groups have been recognised. All are hard and well-fired, though fabric 2 is slightly softer. Inclusions have been finely crushed and grog is the favoured material to be used as an opening agent. Small crushed stone and possibly sparse shell have been used in fabric group 1 and there are probable organic voids in fabric 2, giving these sherds a porous appearance. Fabric 3 is denser and would appear to have contained only grog. These fabrics have only been identified macroscopically. Clear traces of join voids and/or coil breaks on some sherds (e.g. P1, P5, P15) indicate that coil, ring or strap building was the preferred potting method and the black cores of almost all sherds indicate a relatively short firing time (though long enough to completely fire the pots). Carbon deposits on two pots (P5, P15) indicate that they have been used to hold foodstuffs prior to their deposition.

Decoration is from a limited repertoire of grooving, fingernail impressions, scratching and stab and drag (Fig. 5.22). Grooving, defined as broad, relatively shallow incision, is present on only two or three vessels (P11 and P12, and possibly P17) and comprises short, oblique lines. Fingernail impressions are similarly rare (P3 and possibly P18) and appear to have been arranged randomly and sparsely. Scratched or lightly incised lines have been used to decorate two vessels (P1 and P2) and enough of P1 survives to identify the motif as filled opposed triangles. The implement used has had a jagged tip so that each scratch is, in effect, double. Stab and drag impressions are the most commonly used technique and they are found in straight lines (P7 and P9), rows of diagonal

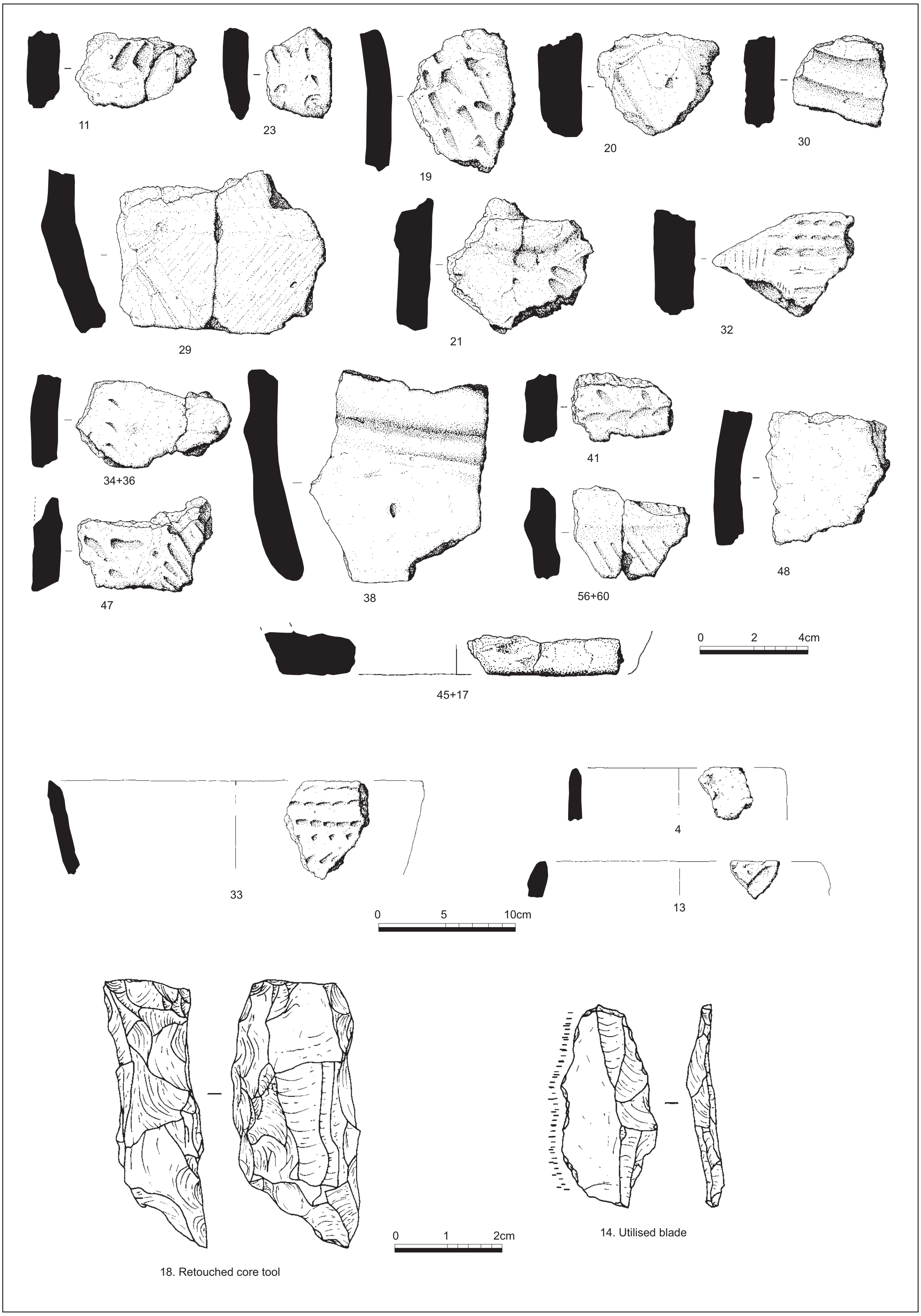


Fig. 5.22. Small finds from Milfield North.

impressions (P7, P8 and P11) and in a herring-bone motif (P10, P11 and P13). On each of the stab and drag decorated vessels, the implement appears to have been the same or very similar.

The decoration on P6 is lightly scored and comprises multiple faint stab and drag impressions. In this vessel, sufficient decoration survives to identify an opposed filled chevron motif similar to the scratched sherds already described. The traces of a single, post-firing perforation through this sherd suggests an attempt at repair.

Cordons are invariably raised and occur in both horizontal (P5) and vertical (P1) arrangements. None are decorated.

A single well-defined grain impression was identified on the outside of P5.

Vessel sizes are difficult to estimate. The diameters of two rim sherds (P7 and P10) can be estimated at 280mm and 140mm respectively though it must be remembered that the rims of prehistoric vessels may be irregular and estimates of size from small sherd evidence can be very inaccurate. The same proviso applies to the estimate of 160mm for the diameter of the one base sherd from the assemblage (P4). Nevertheless, these estimates suggest a mixture of large and small vessels and this observation may be supported by the thickness of some of the sherds themselves. Large heavy sherds such as P5, P6 and P7 suggest larger vessels while smaller pots are represented by thinner sherds such as P3.

Discussion

The material appears to represent a pure Grooved Ware assemblage with no sherds from other ceramic traditions identifiable. In-curved rims from P5 and P7 suggest large, barrel-shaped vessels, while smaller rims (P10 and P3) indicate the presence of smaller, tub-shaped pots. The restricted range of both fabrics and decoration described above suggests a broadly contemporary range of vessels, and the similarities noted in the detail of the stab and drag impressions of vessels P7, P8 and P14 indicate the use of the same tool on these sherds. They are likely to represent the work of the same potter. The material from the Milfield Basin is important in providing a link between the Grooved Ware sites of Yorkshire and those of southern and central Scotland.

The inturned and internally bevelled rims, the vertical cordons and the use of filled opposed triangle motifs indicate vessels in the Durrington Walls substyle as identified by Longworth (Wainwright and Longworth 1971). The form of P1 in particular would place the pottery later within this substyle according to Garwood's (1999) re-examination of the material. The radiocarbon evidence is limited, but the Durrington Walls substyle would appear to have a currency of almost a millennium (*c.*3000–2000 cal BC) but, if Garwood's scheme is accepted, then a date within the second half of the third millennium cal BC might be expected for this material and this does indeed correlate with the radiocarbon dates obtained for the primary pit fill. This, of course, assumes that the northern material is contemporary with that in the South. The four radiocarbon dates listed by Manby (1999) for the Durrington Walls style in the north of England do little to alleviate the problem, calibrating to *c.*2900–2200 cal BC.

Manby (1974; 1999) lists eight Grooved Ware findspots in Northumberland. These sites, however, are in drastic need of review and may have suffered, in the present writer's opinion, from some mis-identifications (see Gibson 2002 for full discussion).

At Milfield North (Harding 1981), the pottery came from the middle fill of pit 2 in the pit alignment. The pottery is fragmentary and while it is decorated with both impressed and incised techniques, the radiocarbon dates (from bulked material), spanning 2300–1700 cal BC, are perhaps more in keeping with an Early Bronze Age identification. The presence of 'fine to medium grit' inclusions *possibly* also supports this hypothesis and a re-assessment of the material is overdue.

The pottery from the secondary silts at the Yeavering henge may also have been mis-identified. Certainly the presence of cordons in the upper third of some vessels, the occurrence of oblique incisions above this cordon and the presence of abundant large, angular inclusions all find better parallels with material from Bronze Age contexts such as at Standrop Rigg (Jobey 1983), Green Knowe (Jobey 1980), Houseledge (Burgess 1995) and Wether Hill (Gibson 2000) than with classic Grooved Ware assemblages in Scotland and the North of England.

Harding (1981) uses pottery from Thirlings (Miket 1976 Fig. 7.15) to support his identification of the Yeavering henge material as Grooved Ware. However the Thirlings pottery is unstratified and comes from the ploughsoil. It seems to have been identified as Grooved Ware only by reason of its cordon. As noted above, this feature may as easily find parallels in the Middle to later Bronze Age. The cord-decorated Durrington Walls style pottery from Thirlings referred to by Manby (1999, 70) may equally be attributable to local Impressed Wares (see Miket 1976). The radiocarbon date associated with this assemblage from Feature 466 has a large margin of error (130 years) which means that at 2σ the date range spans the whole third millennium. Nevertheless, the probability is greater for the half prior to 2500 cal BC and so an Impressed Ware identification may still be acceptable. The Grooved Ware (lugged sherd) also listed by Manby (1999, 70) may also be a dubious identification given its association with Peterborough Ware (see Gibson and Kinnes 1997).

The small bucket-shaped pot with applied lugs from Whitton Hill 1 is also not necessarily a convincing Grooved Ware identification (Miket 1985). Coming from secondary contexts within a segmented ring ditch, it is associated with two radiocarbon dates. Unfortunately, there are problems with these dates. Firstly, they have been obtained from unidentified timber charcoal and so an 'old wood' factor must be considered. Secondly, these dates suffered from the calculation errors at the British Museum in the early 1980s. They have been recalculated (BM2265R; 3980±130 BP and BM2206R; 3970±110 BP) but have such margins of error that they span the period *c.*2900 and 2000 cal BC (at 95% confidence). Once more a Bronze Age affinity might be suggested for this sherd though it must be acknowledged that similar vessels have been found at Carnaby Top Site 20 and North Carnaby Temple Site 3 (Manby 1974).

Also at Whitton Hill 1 (Miket 1985), Meldon Bridge style Impressed Ware was identified in association with, and containing, the central cremation. Cremations with Impressed Wares are extremely rare and it is notable that none of the pits associated with Impressed Ware at the Meldon Bridge type site (Speak and Burgess 1999) contained cremations. The rim sherd illustrated in the Whitton Hill report may find good parallels within the Food Vessel Urn class of pottery with which associated cremations are far more common. The radiocarbon date, obtained from unidentified charcoal, may also suffer from the old wood effect mentioned above and once again has had to be re-run due to the initial BM laboratory error. The recalculated date (BM2266R; 3960±130 BP) calibrated to 2890–2040 cal BC. If an earlier Bronze Age identification is accepted for this vessel, then the Grooved Ware sherd from the upper fill (Miket 1985, P2) is also likely to be Bronze Age in date.

The pottery from the pit alignment at Ewart 1 (Miket 1981) is more in keeping with Grooved Ware. Converging parallel grooves (e.g. No.4.10) suggest a Clacton style element as identified by Manby, but near-vertical internal bevels (3.3 and 5.16) may hint at a Durrington Walls element, though this is not conclusive by this trait alone. A Clacton style sherd was found by Greenwell at Redscar Bridge (Longworth 1969) and Woodlands and Durrington Walls style pottery has been found at Old Yeavering (Ferrell 1990).

If the material from Thirlings, Yeavering henge and the Milfield North pit alignment is regarded as earlier Bronze Age then Grooved Ware finds are not as extensive in the Milfield region as previously believed. Furthermore, as 'classic' Grooved Ware assemblages have now been recognised (especially at the present site, Cheviot Quarry and Yeavering) it brings into question the past identifications of atypical material. As mentioned above, a review of this pottery is now overdue and further discussion can be found in the accompanying volume (Passmore and Waddington in prep.).

The pit assemblage is typical of other ceramic associated pit assemblages elsewhere (*inter alia* Speak and Burgess 1999; Gibson 1999 159–163) in that the material is not reconstructable, is abraded, and represents a number of vessels. This is clearly material derived from another context and such pits must be regarded as places of secondary deposition. Such depositories can no longer be regarded as representing the casual disposal of domestic rubbish but rather must be considered as special deposits of fragmentary domestic material, possibly votive in nature.

Lithics
by Clive Waddington

A total of 18 lithics was recovered from stratified contexts: seven from the upper fill of pit 1 (context 4), six from the lower fill of pit 1 (context 9), and five from the fill of the linear feature (context 2). Most of the lithics are broken and none are diagnostic. The lithics from the linear ditch, which are all of local non-flint material, are probably residual pieces that have been incorporated with the backfill. All the lithics from pit 1 are made from flint (Fig. 5.22) – all of which is of high quality and imported to the area. The nodular flint has evidently come from a distant source, the nearest being the Yorkshire Wolds, while the light grey speckled flint is probably of a north-east Yorkshire origin. Most of the flints are simple flakes indicative of primary and secondary stoneworking at or near to the pit. The small burnt pieces may have been incorporated with the fragments of burnt bone and together with the bone, charred hazelnuts and charcoal are indicative of fires being lit close to the pit.

Linear Ditch

1. Tiny quartz core with heavy patina development. Maximum dimensions 17mm by 14mm. Undiagnostic.
2. Small brown chert flake with utilisation along one edge. Maximum dimensions 24mm in length by 20mm wide by 10mm thick. Undiagnostic.
3. Tiny red agate broken chip. Undiagnostic.
4. A grey chert flake with some utilisation, and possibly even edge-trimming, along two of its edges. Maximum dimensions 36mm in length by 27mm wide by 12mm thick. Undiagnostic.
5. A tiny red agate chip. Maximum dimensions 11mm long by 8mm wide by 6mm thick. Undiagnostic.

Pit 1

Upper Fill (context 4)

6. Broken grey flake made from high-quality flint. Undiagnostic.
7. Broken tiny grey flint flake made from high-quality flint. Undiagnostic.
8. Broken translucent grey flake made from good quality flint. Undiagnostic.
9. A tiny burnt flint chip. Maximum dimensions 14mm long by 8mm wide by 1mm thick. Undiagnostic.
10. A tiny broken burnt flake. Undiagnostic.
11. A tiny broken grey flint flake. Undiagnostic.

No.	Find	Context	Fabric	Description
P1	29, 56, 57, 60 1xs*	9 4	1	Five sherds. Nos 56 & 60 join. The fabric is hard and well-fired with reddish-brown surfaces and a grey/black core. The fabric averages 10mm thick and contains finely crushed stone inclusions 1–2mm across. Coil breaks are visible at the top and bottom of the sherds and join voids are visible within the fabric of No 29. The decoration comprises a low, undecorated raised vertical cordon separating two zones of opposed filled chevron decoration. This decoration is scratched rather than grooved.
P2	20	9	2	Single sherd in a soft porous fabric with finely crushed grog inclusions measuring 1–2mm across. The surfaces are reddish-brown and the core black. The sherd is 15mm thick. The faintly scratched decoration on the pitted outer surface seems to represent a panel of opposed filled chevron motif.
P3	23, 34, 36, 49 1xs 5xs	4 9 4 9	2	Nine sherds (34 & 36 join) in a well-fired but porous fabric with a brown outer and dark brown inner surface. The core is grey. The fabric seems to contain some finely crushed grog and averages 8mm thick. No. 23 is a rim sherd from a slightly in-turned vessel and with an angled internal bevel 7mm deep. Two smaller rim sherds found during sieving of context 9 also fit this description. The decoration is restricted to Nos 23 and 34 and comprises apparently randomly dispersed fingernail impressions.
P4	17, 45, 48	9	3	Three sherds (17 & 45 join), possibly from the same vessel, in a hard, well-fired fabric with a light brown outer surface, black inner surface and core. The inside surface of 17 and 45 are light brown. The fabric contains finely crushed grog up to 2mm across but is not porous as is fabric 2. The fabric averages 9mm thick. Nos 17 and 45 join to form a base *c*.160mm in diameter. Undecorated.
P5	38	9	2	Single rim sherd in a hard and well-fired fabric, black throughout. It appears to contain finely crushed grog and other, lighter inclusions rarely over 2mm across. The rim is simply rounded and slightly in-turned. Join voids are visible within the thickness of the pottery. The sherd averages 14mm across. A single raised horizontal cordon runs across the sherd some 50mm down from the rim. There is a single well-defined grain impression in the external surface. There are also slight traces of external sooting just below the rim. Undecorated.
P6	32	9	2	Single thick (12mm), black sherd in a well-fired but soft and slightly porous fabric. The inner surface in particular shows wipe marks and is slightly pitted. The fabric appears to contain finely crushed (2mm) grog inclusions. There are traces of a single perforation through the sherd. This has measured an estimated 10mm diameter at the outer surface and narrowed to approximately 5mm at the point at which it broke through the inner surface. The decoration is lightly scored and comprises multiple faint stab and drag impressions. Two directions are discernable suggesting opposed filled chevron motif.

Table 5.9. Catalogue of ceramic vessels from Milfield North pit 1.

12. A small cortical flake made from a dark grey high-quality nodular flint. Maximum dimensions 12mm long by 12mm wide by 4mm thick.

Lower Fill (context 9)

13. A small dark grey flake made from high-quality flint. Maximum dimensions 14mm long by 11mm thick by 2mm thick. Undiagnostic.

14. A utilised blade made from high-quality light grey speckled flint with a triangular section. Maximum dimensions 36mm long by 18mm wide by 4mm thick (illustrated Fig. 5.22).
15. A small broken grey flint flake. Undiagnostic.
16. A small broken cortical flake made from high-quality nodular flint. Undiagnostic.
17. A small light grey flake. Maximum dimensions 15mm long by 14mm wide by 2mm thick. Undiagnostic.
18. A thick broken blade tool, possibly once a fabricator, made from good quality light grey speckled flint. Abrupt retouch along both long sides (illustrated Fig. 5.22).

Archaeobotanical Macrofossils
by Jacqui Huntley and Jacqui Cotton

Hazelnut shell fragments were the only charred remains identified, indicating the utilisation of local wild resources as is typical for many Neolithic sites in Britain. Previous work on the botanical remains from the nearby Whitton Hill ring ditches has also revealed the presence of hazelnuts, though in lesser numbers than from this site (van der Veen 1982a), while archaeobotanical work on the nearby Neolithic settlement at Thirlings revealed thousands of hazelnut fragments, interpreted as representative of food storage (van der Veen 1982b).

The non-charred material is all likely to be modern intrusions especially given that grass seeds were recovered. Such material, unlike the seeds of elder for example, is delicate and rarely preserves even in highly anaerobic conditions, let alone the aerobic soils present here.

Charcoal Identification

Hazel charcoal fragments were found in both fills of pit 1 as well as some from each of oak, ash, birch and *Salicaceae*. Together these probably indicate the presence of mixed deciduous woodland in the area.

Discussion

The evaluation trench excavated over the Milfield North ditch and pits aimed to explore a type of crop mark feature never previously excavated in the Milfield Basin and for which no chronology, function, structural form or associations were known. Unfortunately the status of the linear ditch remains obscure. It may be associated with the pits but this is by no means certain and so its date, associations and purpose remain unknown. However, it is now confirmed as an anthropogenic feature and appears to have formed some sort of boundary concerned

Species	**Linear Ditch Context 2**	**Pit 1 Context 4 (2 Samples)**	**Pit 1 Context 9 (2 Samples)**	**Pit 2 Context 6**
Volume Processed (litres)	**10**	**20**	**20**	**10**
Charred Remains (counts)				
*Corylus Avellana (*Hazel nutshell*)*		27	1	
Waterlogged Remains (abundance)				
Chenopodium album (Orache)	1	1	1	1
Polygonum aviculare (Knotgrass)		2	2	1
Fallopia convolvulus (Black bindweed)	1	2	1	1
Gramineae undiff. (Grass)		2	2	1
Sambucus nigra (Elderberry)			1	1
Stellaria media (Chickweed)				1
Trifoilum sp. (Clover)				1
Carex sp. (Sedge)			1	

Table 5.10. Summary of archaeobotanical macrofossil results from Milfield North.

Species	Pit 1 Context 4	Pit 1 Context 9
Charcoal Remains		
Quercus (oak)	✓	
Fraxinus (ash)	✓	
Corylus (hazel)	✓	✓
Betula (birch)/ Salicaceae (willow/poplar)		✓

Table 5.11. Summary of charred wood identifications from Milfield North.

with partitioning the land. This feature may be part of a later system of land use relating to stock keeping, or a field system. The information gained from one of the pits is, however, of considerable interest. Pit 1 with its two distinct fills produced an important assemblage of Grooved Ware in addition to lithics, tiny unidentifiable fragments of burnt bone, charred wood and hazelnut shells, the latter being indicative of gathered resources. Radiocarbon dating of the pit 1 fills has produced dates of the mid third millennium cal BC, placing it in the Late Neolithic period.

The Milfield North field contains the remains of an important group of monuments that form part of the vast Late Neolithic and Beaker period ritual complex spread across the valley. In the south-west corner of the field is a series of ring ditch features, the distribution of which spreads over the A697 trunk road to form part of the Whitton Hill cremation cemetery. One of the ring ditches in the Milfield North field was excavated by Miket (1985) revealing a monument that had an interrupted ditch with a circle of pits inside, some of which contained evidence for having held timber uprights. A series of pits containing cremations was found inside the internal ring of pits and another between the ditch and inner ring. The presence of these features makes the site difficult to classify as its small size, 14m across, is more in keeping with that of ring ditch cremation cemeteries, whereas its structural form is directly analogous to that of the Milfield North henge. As this monument forms part of the Whitton Hill ring ditch complex it is probably best to view it as a part of this ceremonial milieu rather than a henge proper as it is spatially related to these other burial sites. Either way, the incorporation of this site into our modern-day classifications of these monuments remains problematic. It is perhaps best viewed primarily as a ceremonial monument within a cremation cemetery though it had some cremated deposits within it.

The Milfield North Henge is situated on the south side of the field and was excavated during the mid 1970s by Anthony Harding (1981) who was able to record a very detailed plan of the site. Further analysis and interpretation of these features has been used to suggest a sophisticated use of the architecture to prescribe movement through the monument (Waddington 1999, 161–2). Experimental work by the author has shown that the inner ring of pits identified by Harding were sufficiently deep to have contained timber uprights, as can be seen at the reconstruction of this monument at the 'Maelmin Heritage Trail' in Milfield village (Fig. 5.23). The double pit alignment, also excavated by Harding (1981), produced some pottery sherds, burnt bone and charred material that provided three Early Bronze Age radiocarbon dates, which, together with the pottery, indicate its contemporaneity with the Milfield North henge and the Whitton Hill cremation cemetery, though the Milfield North pit excavated as part of this project is clearly earlier than this monument complex.

The excavations on the various monuments at Milfield North, as well as the henge at Milfield South

Fig. 5.23. The reconstruction of the Milfield North henge at the 'Maelmin Heritage Trail'.

(Harding 1981; Miket 1985), produced a suite of overlapping Early Bronze Age (Beaker period) radiocarbon dates. This provides a strong case for these monuments having been used contemporaneously as part of an organised ritual complex that stretched the length of the basin, whilst the Milfield North pit that contained Grooved Ware proper clearly dates from an earlier horizon of Late Neolithic activity.

The results from this investigation have important implications for understanding the intensive Late Neolithic and Early Bronze Age activity evidenced on the gravel terraces of the Milfield Basin as they show the Milfield North complex to have earlier antecedents than previously thought. They have also provided a set of dates directly associated with a purposefully discarded assemblage of Grooved Ware. The pits are effectively isolated features although it can be reasonably assumed that more such pits survive close by as Neolithic pits of this sort are known to occur in clusters elsewhere across the Milfield Basin, as at Thirlings (Miket 1987), Cheviot Quarry (Johnson and Waddington in press) and Lanton Quarry (Waddington and Johnson in press). The placing of Grooved Ware in the pit indicates that the pit was backfilled with burnt and broken material as part of a formal act perhaps votive in nature. The lighting of fires near or at these monuments was evidently a common activity and, together with the presence of burnt bone within the fill, suggests such activity could have had a ritual basis.

The Milfield North pit and later ceremonial complex is located within a topographically defined unit of land, being on a flat terrace straddling the northern entrance into the valley between Whitton Hill to the West and the River Till to the East. The valley constricts here and could not be entered from the north without passing through this neck of land and in this way the Milfield North ceremonial complex controlled access into the basin from the north. Bearing in mind the proposed linkage of the Milfield monuments by ceremonial procession, it can be observed that the Milfield North complex forms part of a much wider ritualised landscape that includes the Yeavering complex which controls access from the west, the Ewart complex guiding passage across the River Till from the south or east, and the Milfield South/Coupland/East Marleyknowe henge complex that dominates the centre of the basin and which is linked by the 'droveway'. This is a fascinating example of what some commentators might call a 'sacred geography' mapped out across an entire valley floor to form a ritual focus for a much larger surrounding region. As our understanding of the landscape and this ritual complex develops we may be able to gain further glimpses into the minds of the people who put so much energy into mapping out their spirituality across the landscape.

The unexpected discovery of the Milfield North pits was incidental to the examination of the boundary feature visible as a cropmark on aerial photographs. Such pits rarely show on aerial photographs, and given their small size, would be highly unlikely to show up during geophysical survey. Close-spaced fieldwalking could potentially be used to identify concentrations of such pits, as was the case at the Lanton Quarry site (see Chapter 3 this volume and Waddington and Johnson in press), but ultimately such remains will only be identified during full surface stripping of the topsoil or fortunate positioning of evaluation trenches, as in this case. Given that all the open area excavations so far undertaken on the sand and gravel terraces of the Milfield Basin (Thirlings, Yeavering, Cheviot Quarry, Lanton Quarry) have produced Neolithic pit clusters it should be assumed that such deposits can be expected whenever development on these surfaces takes place.

TURVELAWS FARM RING DITCH

Introduction

The Turvelaws ring ditch (SMR number NT93SE37) survives as a buried cropmark site with no surface remains visible above ground (Fig. 5.24). The site is located at NT99256310 in a ploughed field, located on a raised alluvial terrace that is probably of Holocene age that grades into a Late Glacial outwash fan on low ground on the valley floor (Fig. 5.25). There are wide views from the site to the encircling horizons dominated by the nearby sandstone escarpments of Dod Law and Weetwood Moor to the east and by the Cheviot Hills to the south and west. The site occupies a position close to the 37m contour on the edge of the flood basin, contained within a neck of land bordered by the Wooler Water to the east, the River Till to the north and the River Glen to the west. The location of this ring ditch site close to water courses and on low lying land at the edge of the flood margin recalls the liminal locations and riverine settings associated with other Late Neolithic/Early Bronze Age ritual monuments and cemeteries. The subsurface geology consists of fine-grained Holocene alluvial sediments which themselves overlie glacio-lacustrine silts and clays. The soils covering the terrace have been characterised by Payton (1980) as gleyic brown alluvial soils and are generally stone-free and fine-grained. With the installation of field drains these otherwise damp terraces have recently been brought under intensive agricultural production primarily for potatoes, carrots and winter wheat. No archaeological remains other than ridge and furrow cultivation have previously been attested or investigated on the Holocene deposits of the alluvial valley floor. Therefore, the discovery of this site is significant as it indicates that archaeological remains dating back to the prehistoric period are located on these surfaces.

Fig. 5.24. Aerial photograph showing the Turvelaws ring ditch.

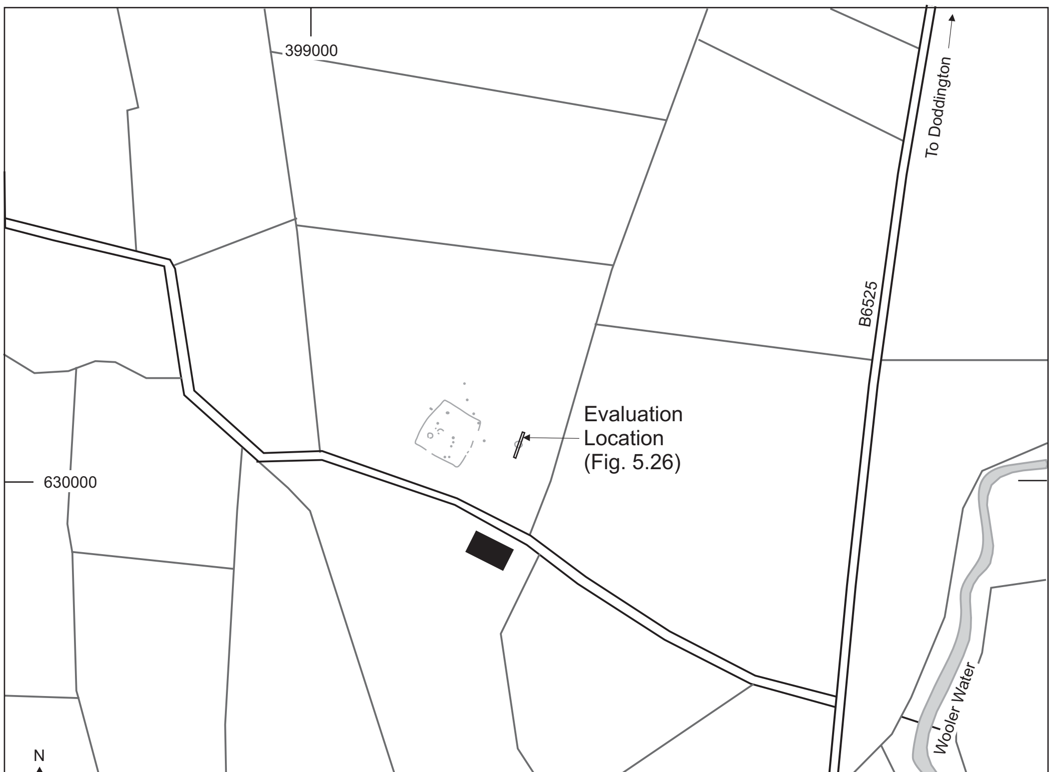


Fig. 5.25. Turvelaws ring ditch location plan.

The site at Turvelaws forms part of a mosaic of Late Neolithic/Early Bronze Age ritual and, presumably, funerary sites that occupy the floodplain margin of the Milfield Basin. The cemeteries identified 1km due north near Doddington, and those at the base of Whitton Hill (Miket 1985) and East Marleyknowe all survive as ring ditches visible as cropmark sites on aerial photographs similar to that at Turvelaws. Miket's excavations on the Whitton Hill sites produced remains of cremated human bone including adults and children, sherds of Late Neolithic/Early Bronze Age ceramics, plant remains including wheat and barley together with radiocarbon dates, placing the ring ditch cemetery in the third millennia cal BC (see Table 5.32 below).

The Turvelaws cropmark is visible as a small circular ring about 7m across with a broad ditch and an entrance to the south, with a possible pit situated inside the entrance causeway. Within the monument are what appear to be two central pits that could mark the position of cremation deposits. The field had been ploughed for potatoes and the soil ridged up ready for planting prior to cutting the trench. The field had been subsoiled, or deep ploughed, for the potato crop and this meant that severe truncation of the archaeology had taken place.

Excavation

The field surface over the area of the intended excavation trench was fieldwalked prior to the removal of topsoil, and a single flint and two modern pottery sherds were recovered. The flint was a broken segment of a blade tool that had steep retouch along one of its long edges made on an orange-grey flint (see below Fig. 5.27). The piece is not particularly diagnostic although it does indicate prehistoric activity on the site of the ring ditch.

A single evaluation trench measuring some 22m by 4m was opened across the full width of the parchmark ring on an almost north–south alignment. After removal of the topsoil (context 1) a series of archaeological features was observed in the trench (Fig. 5.26). Apart from two modern field drains (contexts 14 and 16) these included two slight gullies (contexts 4 and 20), one of which is thought to be the southern arc of the ring ditch, together with four shallow scoops (contexts 2, 6, 10 and 12) and a large spread of sandy material (context 8). All fills were 50% sieved in order to maximise finds retrieval but no small finds were recovered. Samples were taken from all deposits for flotation and the analysis of botanical macrofossils. No material suitable for dating was forthcoming and no artefacts were recovered from the archaeological deposits. Samples were taken for pollen analysis but the pollen contained in all the samples was sparse and highly degraded, preventing positive identification. The site has been very heavily truncated. Two 1m square test pits were excavated to a 1m depth from the base of the trench to establish the alluvial origin of the sediments. Sequences of fine-grained laminated silts and sands were observed consistent with their identification as Holocene alluvium.

Features

North Gully

This stretch of gully was straight in the section exposed in the excavation trench with no curve to it and this makes it unlikely that it formed part of the ring ditch circuit. It has been heavily truncated by ploughing and survives as a sub-surface linear slot with an open u-shaped section with concave sides and rounded base. It had a regular width of 0.8m and a maximum depth below the base of the modern ploughsoil of 0.36m. Two 1m wide sections were cut across the feature and 50% of the fill sieved to recover any artefactual evidence. However, no artefactual material was obtained. The fill (context 20) was a slightly compacted reddish brown silt with no stone inclusions. It is a fine-grained deposit derived from the naturally occurring alluvial material which makes up the landform on which the site is located. The gully had been cut into the natural underlying alluvium (context 18) which was a loose orange-brown ferruginous sandy silt. The regular linear shape of this feature suggest that it is not prehistoric in date and could be the remains of a later feature on the site, perhaps associated with drainage works.

South Ditch

This shallow ditch, thought to be part of the southern arc of the ring ditch circuit, was curved towards the north. It survives as a sub-surface truncated ditch with concave sides and a flat base. It had a regular width of 1m and a maximum depth below the base of the modern ploughsoil of 0.11m. Two 1m wide sections were cut across the feature. The fill (context 4) was a loose orange-brown sandy silt with no stone inclusions. No finds were recovered.

Scoops

Four heavily truncated features surviving as small scoops in the terrace surface were excavated. All had an irregular sub-circular shape and survived only as shallow features averaging 0.06m deep below the base of the ploughsoil. All the scoops were on the same north to south alignment across the site suggesting that they are contemporary and formed part of a related feature, perhaps the basal remains of an old fenceline. No artefacts or material suitable for dating were obtained from these deposits. A single charred seed was recovered from context 2 after flotation of the deposit. However, the presence of this single seed from a context immediately below the ploughing horizon cannot be used to infer agricultural practice since the taphonomy of this deposit remains insecure.

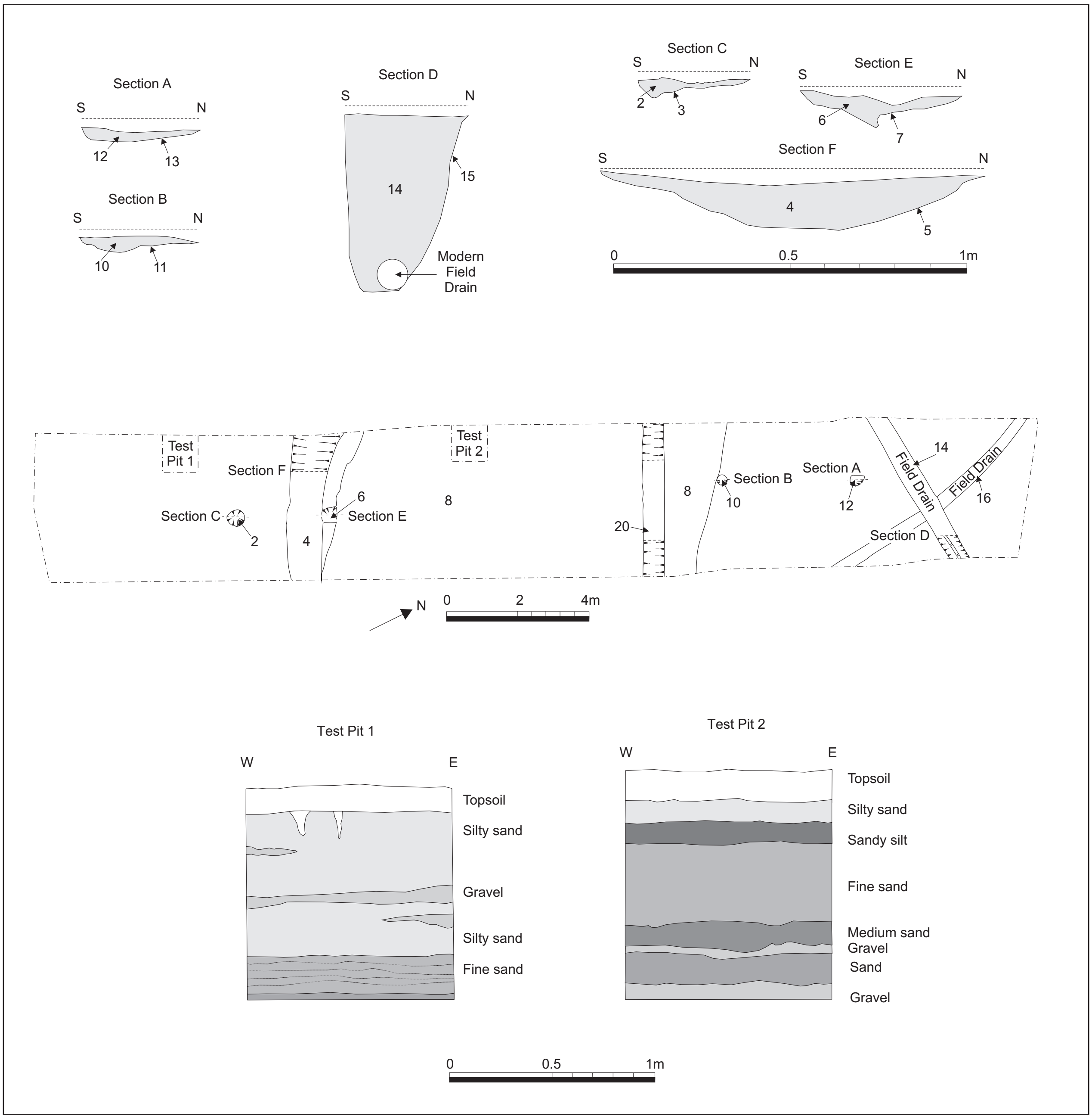


Fig. 5.26. Turvelaws ring ditch trench plan and sections.

Sandy Spread

A spread of sandy material (context 8) was situated over the area of the north side of the ring ditch with a maximum length of 10.2m and extended across the full width of the trench. The deposit consisted of a fine white compacted sand. The sand had inclusions of manganese within it. No finds or charcoal were visible in this spread and although a section was cut across it and the deposit sieved, no artefactual material was obtained. It remains uncertain whether this deposit was of anthropogenic or natural origin, although it was considered during excavation to be most likely a thin band of natural alluvial sediment.

Field Drains

A linear cut (context 14) was observed running obliquely across the trench at its northern end. A section was excavated across this feature and revealed it to be the cut for a field drain. A modern ceramic drainage pipe was encountered towards the base of the cut. A single sherd of prehistoric pottery (Fig. 5.27) was recovered from this field drain. The ceramic is a rim sherd from a pot with an orange gritted fabric. It is not clear whether the ceramic is part of an open vessel with everted rim or a globular vessel with a narrow neck. It is not diagnostic though its relatively thin wall hints towards a later prehistoric date.

Feature (context)	Diam (m)	Length (m)	Width (m)	Depth (m)	Description
2 Small scoop		0.35	0.31	0.05	Scoop with an irregular shape with an asymmetric profile. The fill was a loose grey-brown silty loam with occasional charcoal flecks.
6 Small scoop	0.3			0.09	Scoop with an irregular profile with one steep concave side and a more gentle stepped convex side. The fill was a loose pale brown-orange sandy silty containing manganese inclusions.
10 Small scoop		0.4	0.32	0.06	Scoop with irregular profile with an uneven base. The fill was a loose brown-grey silty clay.
12 Small scoop		0.37	0.31	0.04	Scoop with irregular profile with uneven sides and a slightly concave base. The fill was a loose grey-brown silty loam derived from an earlier topsoil.

Table 5.12. Characteristics of scoop features at Turvelaws.

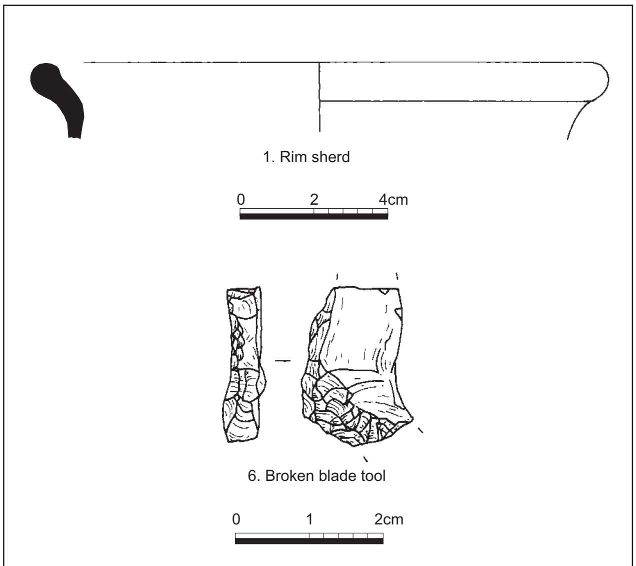


Fig. 5.27. Small finds from Turvelaws ring ditch.

Archaeobotanical Macrofossils

by Jacqui Huntley and Jacqui Cotton

A single charred grain of breadwheat was found in the fill of a heavily truncated shallow scoop feature (context 2). The earliest evidence for the cultivation of breadwheat in northern England is dated to the latter part of the Bronze Age (Huntley and Stallibrass 1995) although a single grain was recovered from an Early Neolithic pit during the excavations on the Coupland enclosure (see above, this volume). The only waterlogged seeds were from weeds associated with agricultural activity. In addition they were durable and therefore indicative of preferential preservation over time or reflecting modern material. Straw was present in all of the small flots, except for context 20. Given the generally dry and aerobic nature of the deposits the straw is likely to be a modern contaminant.

Discussion

The evaluation trench excavated over the Turvelaws ring ditch revealed a very heavily truncated site with only extremely shallow archaeological deposits surviving below the ploughsoil. The site is regularly deep ploughed for potatoes and this has clearly had a significant effect on the survival of the underlying archaeological remains. A worked flint with steep retouch was recovered from the ploughsoil above the site of the ring ditch, attesting to prehistoric activity on the site, together with a sherd of later prehistoric pottery from a residual context, adding further support to this observation. Although unstratified, these finds are useful as they support the interpretation of the cropmark as a ring ditch site, and together form some of the first evidence so far discovered for the survival of prehistoric sites on the Holocene alluvial deposits of the Milfield Basin. This has important implications for managing this area as the absence of prehistoric activity on these landforms may be more apparent than real. This said, all the evidence accrued as part of this project for the Holocene alluvial areas suggests that they were clearly not occupied as intensively or routinely for settlement as other parts of the plain, such as the sand and gravel terraces or low Cheviot slopes.

THREECORNER WOOD PALISADED ENCLOSURE

Introduction

The Threecorner Wood site is an almost circular palisaded enclosure (SMR number NT93NW45) surviving as a buried site with no remains visible above ground except for a slight depression on the north side along the line of the outer ditch. The site is visible as two parchmark rings on aerial photographs (Fig. 5.28) situated in the north-west corner of an arable field on the valley floor of the Milfield Basin. It is located at NT94103575 on the edge of sandy till deposits with

Species	**Context 2**	**Context 4**	**Context 6**	**Context 10**	**Context 12**	**Context 20**
Volume Processed *(*litres*)*	**9**	**10**	**2**	**6**	**1**	**10**
Charred Remains						
Triticum aestivum (Breadwheat)	1					
Waterlogged Remains						
Chenopodium album (Orache)	2	1	1	3	2	2
Fallopia convolvulus (Black bindweed)	2			1	1	
Urtica dioica (Nettle)				1		
Stellaria Media (Chickweed)	1			1		

Table 5.13. Summary of archaeobotanical macrofossil results from Turvelaws.

a lower terrace of wetter glacio-lacustrine deposits to the west. The enclosure is positioned on free-draining brown podzolic soils (Payton 1980), raised above the floodplain of the valley floor. However, it has been carefully situated on the edge of a bluff with the lower ground of the floodplain immediately to the west of the site and the River Till 500m beyond. Positioned just below the 40m contour, this defended site enjoys the advantages of being situated in a fertile arable area that also has immediate access to the rich resources of the floodplain and the River Till. The field is currently given over to agriculture for the cultivation of winter wheat. The cropmark evidence indicates the roughly circular shape of this small enclosure with an external diameter to the outer edge of the ditch of approximately 60m, with the whole site extending over an area of 0.3 ha. The inner palisade measures approximately 30m by 40m and encloses an area of around 0.1 ha.

No previous archaeological work has been carried out at this site although finds have been recovered from nearby at Ford Westfield (Greenwell 1868, 196; 1877, 403). Here, *c*.1250m to the north of the enclosure, a series of cremations was discovered in a pit with decorated stones and a covering of flat stones during ploughing in the 19th century. Three of the stones carried cup and/or cup and ring markings and indicate Neolithic/Beaker period activity in this area east of the river. Prehistoric ceramics associated with funerary activity have been found near to this cremation site although the exact locations remain unknown. These include a Beaker reputed to have been found in a barrow and now kept by the British Museum (Kinnes and Longworth 1985, 135), and three vessels discovered at various times including one Food Vessel Urn of which only the rim fragments survive (Greenwell 1877, 438). Also in this vicinity, a bronze halberd with two ribs was discovered (Evans 1881, 244) and this is now in the British Museum. Two rectilinear enclosures laid out so as to respect each other are located 1km to the north-east of the Threecorner Wood site with their long axis aligned north-east to south-west. They are located on a slight knoll reaching the 48m contour overlooking the Black Burn to the south, the Bradford Burn to the west and the Canon Burn to the north. The upstanding remains of the Fenton Hill enclosure, whose primary phase was a curvilinear palisaded site like Threcorner Wood, is 4km due west at a higher elevation of 90m OD. In the same field as the Threecorner Wood enclosure are the buried remains of a square broad-ditched enclosure near to where stone has been ploughed up. It is described as a chapel by the O.S. (O.S. cards NT93NW24) but no evidence is provided for this statement.

Fig. 5.28. Aerial photograph showing the Threecorner Wood palisaded enclosure.

Excavation

A single evaluation trench measuring 20m by 3m was opened across the west side of the enclosure encompassing the inner palisade trench and outer ditch of the enclosure (Fig. 5.29). The trench was aligned north-east to south-west and ran perpendicular to the enclosure circuit. The turf and topsoil were removed by machine and the exposed surface containing archaeological features cleaned back by hand. All archaeological features were sampled and recorded before the topsoil was replaced and the site reinstated.

The topsoil consisted of a ploughsoil horizon only at the north-east end of the trench, measuring 0.27m deep, grading into a ploughsoil with underlying subsoil at the south-west end of the trench (Fig. 5.30) with a combined depth of 0.56m. The reason for the greater depth of topsoil at the south-west end of the trench is that this is the lower end of the field where the higher sandy terrace begins to give way to the lower glacio-lacustrine terrace of the floodplain below. Accumulation of sandy sediments over the lip of the terrace edge where the natural substrata dips away has flattened out the south-west edge of the field to produce a greater depth of topsoil in this area and a level surface as seen above ground.

The south-west end of the trench contained a complex geoarchaeological sequence having been positioned over an interface between two distinct geological zones. Furthermore, a palaeosol survived below the upcast of the palisade ditch. The topsoil (context 1) overlay the subsoil (context 26) which in turn overlay a silty clay deposit (context 31) and a dump of redeposited sand (context 27) that was upcast from the construction of the palisade ditch. The upcast sand sealed a soil horizon (context 28) which must have been earlier than the construction of the first phase of the palisade enclosure. The silty clay deposit (context 31) also overlies the buried soil. The buried soil (context 28), or palaeosol, contained charred birch fragments together with burnt bark and waterlogged botanical remains of mint, orache and black bindweed. An agate flake was retrieved from the palaeosol; this was the only small find recovered from the evaluation. The flake was made from translucent agate with maximum dimensions of 14mm in length by 9mm wide by 7mm thick with some cortex surviving. The piece is undiagnostic, though likely to be Mesolithic on account of the raw material.

At the extreme south-west end of the trench where the palaeosol dipped to follow the line of the substratum, this area was found to be very wet, though not

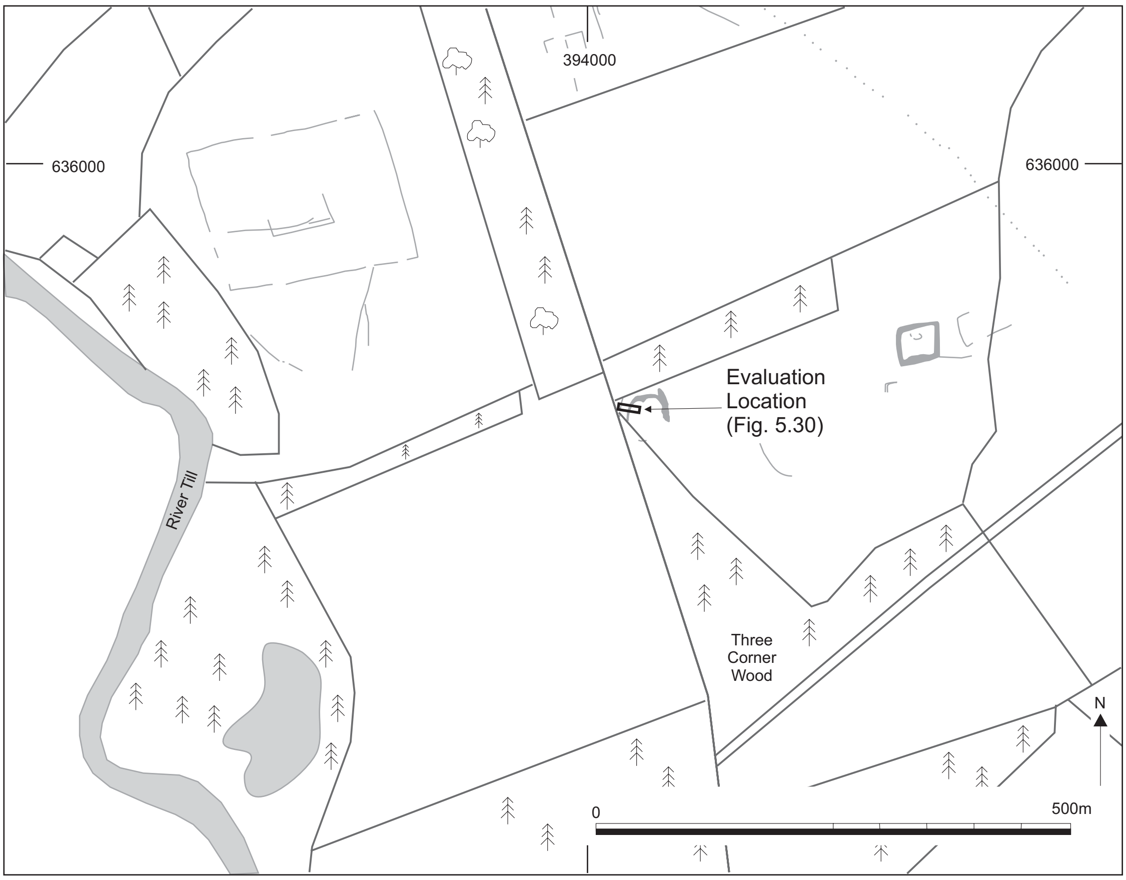


Fig. 5.29. Threecorner Wood location plan.

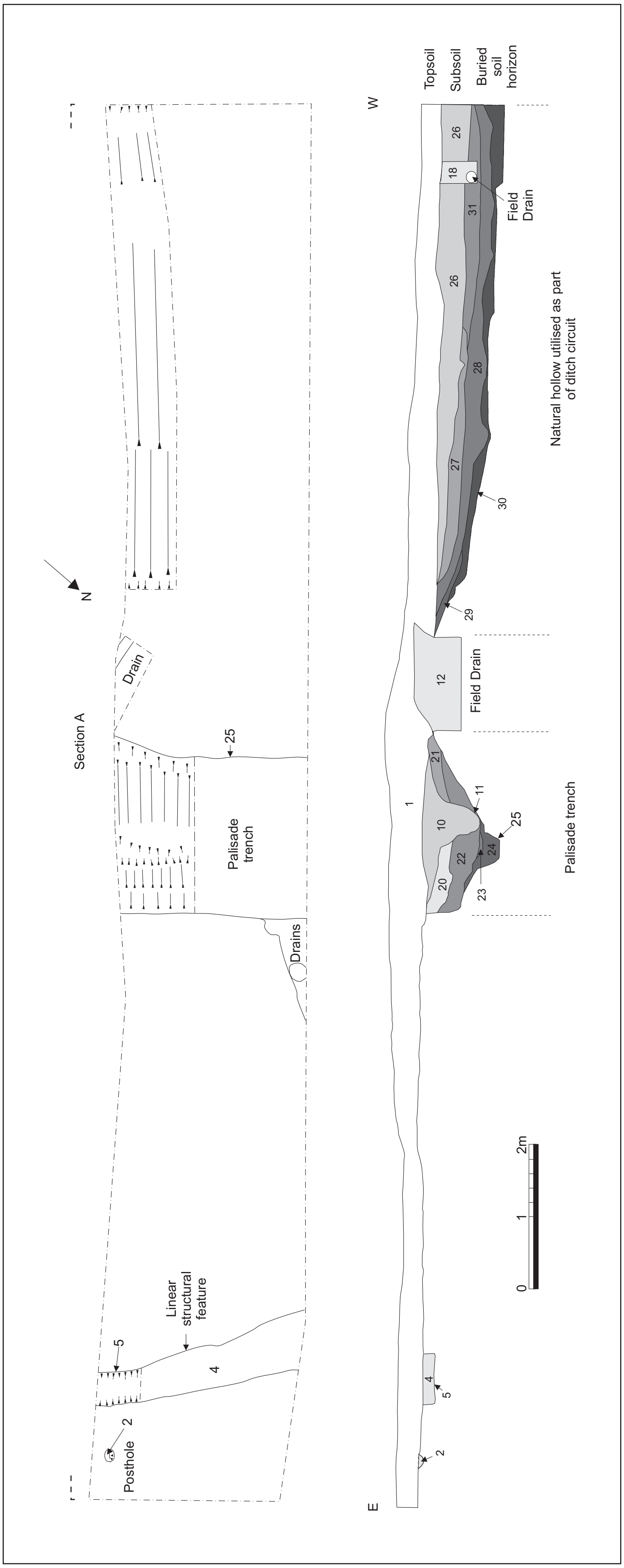


Fig. 5.30. Threecorner Wood trench plan and section drawing.

fully waterlogged. The buried soil overlay a sequence of natural horizons consisting of an orange-brown ferruginous sandy clay deposit (context 29) that overlay a sandy clay gleyed deposit, grey-green in colour.

Features

Two modern field drains were observed running approximately north to south in the south-west end of the trench.

Outer Ditch Circuit

The outer ditch could not be observed in the trench where, according to the aerial photograph, it could have been expected. Instead the excavation showed that here, on the west side of the enclosure, the natural wet hollow formed by the junction of the two different geomorphological landforms had been utilised as part of the ditch circuit. Therefore, although the ditch appears continuous on the aerial photograph the reality is that it is formed by a combination of a man-made ditch on the south, east and north sides and a natural hollow on the remaining side. Today the ground above this hollow is level due to an accumulation of eroded soil resulting from the intensive ploughing of these fields. This natural hollow can, therefore, only be observed at sub-surface level after removal of the topsoil. No evidence for an earthen bank was noted in this section of the defences. However, it is necessary to sound a note of caution with regard to any assumption that the defended circuit was of uniform build as only a small 3m length of the circuit was examined and, as has been noted previously, a properly constructed outer ditch appears to have existed on the north and east sides of the enclosure.

Palisade Ditch

The inner ditch visible on the aerial photograph (Fig. 5.28) is the palisade trench. This consists of a curvilinear ditch measuring 2.3m wide at the base of the topsoil and a maximum of 1.1m deep from the same point. The ditch has been truncated by the plough and its original depth must have been around 1.5m below the surface. A section was excavated across the ditch (Fig. 5.30) in order to observe the constructional sequence. The ditch had been cut with a squared socket running along its base typical of palisade construction trenches elsewhere in the region such as Fenton Hill (Burgess 1984, 156–159), Horsedean Plantation (Miket 1986) and Hetton Hall (see below, this chapter). A second structural phase was evident as the initial construction ditch had been recut, and when initially exposed the section revealed the stained outline of a wooden post set in this secondary fill (context 10). This provides evidence for the enclosure having been rebuilt with a secondary wooden palisade following the line of the original enclosure. The secondary trench cut down through the upper fills of the original trench (contexts 20 and 21) and through one of the lower fills (context 22). Below the lower phase 1 trench fill (context 22), but not cut by the recut, were the upper and lower fills (contexts 23 and 24 respectively) of the original palisade socket cut along the base of the trench. Occasional stone packing was visible in this continuous socket. The socket had been cut so as to take squared timbers and measured 0.25m in width.

Interior Features

A narrow, truncated rectangular feature measuring 0.49m wide could be observed running north to south across the east end of the trench inside the enclosure. The feature was very regular in plan and section and its fill consisted of a minerogenic silty sand stained a darker brown than the surrounding lighter coloured sand substratum. A section cut across it revealed a flat base with straight vertical sides. The form of this feature and the nature of the staining are consistent with this feature being a thick wooden beam that has been split and shaped and used as a foundation for a beam slot structure inside the enclosure. Similar timbers, surviving as minerogenic stains in glacial sand, have been discovered elsewhere in Northumberland (e.g. see Waddington 2007a). Immediately next to the linear slot were the truncated remains of a small round post hole (context 2). The post hole measured 0.14m in diameter and only survived 0.05m deep below the base of the topsoil. The fill consisted of a dark grey-brown soft sandy loam. Together, these features reveal the survival, at least in plan, of structural features within the enclosure consisting of a rectangular or sub-rectangular timber-based building. Other rectangular structures have been noted at palisade sites such as Dryburn Bridge (Triscott 1982), East Lothian. The remains of the rectangular structure at Threecorner Wood survive in a fragile condition and, being situated under a very shallow ploughsoil (0.27m deep), are at risk from obliteration by deep ploughing.

Radiocarbon Dates
by Alex Bayliss, Peter Marshall and Clive Waddington

The evaluation of the Threecorner Wood palisaded enclosure produced some waterlogged material from the buried soil (context 28) sealed by the initial palisade ditch upcast. Two samples were submitted for radiocarbon dating at the Oxford Radiocarbon Accelerator Unit in 2001, processed according to methods outlined in Hedges *et al* (1989), and measured using Accelerator Mass Spectrometry (Bronk Ramsey and Hedges 1997).

These statistically significantly different measurements ($T'=2851.2$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978) are from a context that stratigraphically predates the enclosure and as such OxA-10631 (2280–1980 cal

Context	Material	Lab No.	Radiocarbon Age BP	δ ^{13}C (‰)	Calibrated date (95% confidence)
28 Buried Soil	Waterlogged bark	OxA-10630	6875±45	-26.2	5840–5660 cal BC
28 Buried Soil	Waterlogged bark	OxA-10631	3734±38	-28.7	2280–1980 cal BC

Table 5.14. Radiocarbon dates from Threecorner Wood.

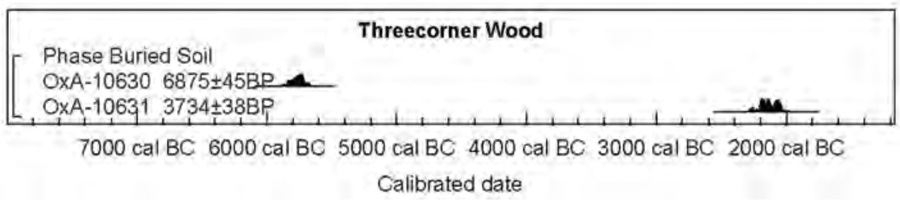


Fig. 5.31. Calibrated dates from Threecorner Wood.

Species	Context 22 Lower fill of phase 1 palisade	Context 28 Buried Soil	Context 10 Upper fill of phase 2 palisade
Charred Remains			
Cerealia indet. (Unidentified Cereal)		1	
Waterlogged Remains			
Chenopodium album (Orache)	1		1
Polygonum aviculare (Knotgrass)			1
Mentha type (Mint)	1		
Fallopia convolvulus (Black bindweed)	1		

Table 5.15. Summary of archaeobotanical macrofossil results from Threecorner Wood.

BC) provides a *terminus post quem* of the Early Bronze Age for the monument (see Fig. 5.31). However, this is not particularly useful as these types of enclosures are generally known from other excavated sites to belong to the second and first millennia cal BC and this must remain the most likely date for this enclosure although an Early Bronze Age date should not be entirely discounted at this stage. No datable material could be acquired from either the palisade slot or the internal features. The two samples for dating were taken from a palaeosol, the lower thickened part of which is perennially waterlogged, and it appears that this represents an accumulation of organic material in a damp area that allowed for the survival of woody material. This buried soil and the associated wet area were later covered over by upcast from the palisade construction trench for the enclosure, and therefore all that can be said with regard to the date of the enclosure is that it post-dates 2280–1980 cal BC. From an environmental perspective, however, these dates indicate the potential of palaeosols containing waterlogged material to survive in this type of environmental setting despite lying immediately adjacent to heavily farmed land and having been partly disturbed and truncated by a later prehistoric enclosure. This sealed palaeosol is a valuable archaeological and palaeoenvironmental resource in itself.

Archaeobotanical Macrofossils
by Jacqui Huntley and Jacqui Cotton

The presence of a single indeterminate cereal grain allows no interpretation. The waterlogged taxa, given the aerobic nature of the soils, are probably modern contaminants but might be the differential remains of contemporary vegetation given that they are all quite woody seeds and hence somewhat resistant to decay. In this case they would suggest cultivation with a hint of dampness from the *Mentha*-type.

Pollen
by Tony Stevenson

The pollen from the buried soil (context 28) was reasonably preserved although all grains showed some signs of degradation. The interpretation offered suggests local alder woodland together with hazel and some oak. Some limited grass pollen was also present.

The pollen from the phase 2 palisade upper fill (context 10) had slightly better preservation (94% grains showing some degradation) with local tree cover dominated by hazel and alder with some open

Species	Context 28 Buried Soil
Charcoal Remains	
Betula or Salicaceae (Birch or Willow)	1
Waterlogged Remains	
Betula (Birch)	2
Total	3

Table 5.16. Summary of charred material from Threecorner Wood.

ground (25% grasses and some ruderal pollen), ferns and sedge.

Discussion

The evaluation trenching has demonstrated that this cropmark was a two-phase palisaded enclosure. A buried soil, predating the phase 1 construction of the palisade, survives in a limited area on the west edge of the enclosure. Dating of material from this soil returned dates representing an accumulation of waterlogged organic material from the Late Mesolithic through to the Early Bronze Age. The phase 1 construction of the enclosure took place some time after this, as upcast from the primary phase of the palisade construction ditch sealed part of this earlier soil. Based on analogy with other monuments of similar form in the Borders region it remains most likely that this enclosure dates to some time in the first millennium cal BC but a Bronze Age date cannot be ruled out. This site would undoubtedly repay further fieldwork as excavation of a larger length would undoubtedly produce material that could date the two phases of palisade construction as well as evidence for the internal arrangements of buildings.

The phase 1 enclosure is represented by the cutting of a steep-sided v-shaped ditch for a timber palisade with a continuous palisade slot cut along the base of the ditch. The palisade slot measured 0.25m wide at the base, indicating the thickness of the phase 1 timbers that were set 1.5m into the ground, suggesting an above ground height of around 3–4m, and a genuinely defensive structure. This compares with the palisade-type enclosures recently excavated at Fawdon Dene on Wether Hill, Ingram (Waddington 2001d), both of which had been cut at least 1.2m deep.

The phase 2 palisade at Threecorner Wood survived as a recut along the line of the phase 1 palisade-type ditch and as such appears to have formed simply a replacement of the original palisade. No datable material was available for the phase 2 palisade but it appears to have replaced the original palisade without any interval or abandonment. The recut for the second palisade had a maximum depth of 0.85m below the base of the ploughsoil, which probably indicates an original depth of 1.2m below the ground surface at the time of construction. This again would have supported a timber palisade of defensive proportions standing between 2.4m and 3.6m above ground. The stain of the surviving timber from this phase that could be observed in the section after initial cleaning revealed an undressed post measuring 0.15m in diameter, so this palisade may have been of smaller construction than that of phase 1.

There was no stratigraphic relationship between the internal features and the palisade phasing so the remains of the excavated internal structure can not be assigned to either the phase 1 or phase 2 enclosure, though it is possible that it may have spanned both phases of the defences. These remains are important as they demonstrate that archaeological residues do survive within these cropmark enclosures, and that they can inform on the layout of structures even though no internal features could be observed on the aerial photographs.

The environmental information recovered from the site indicates that the enclosure was probably situated close to areas of pasture with some cereal cultivation also taking place in the vicinity. Given that the palisade ditch has a circumference of approximately 94m, the phase 1 palisade had square timbers 0.25m across and the stain of the phase 2 timber measured 0.15m, then assuming that the palisade consisted of contiguous posts set next to each other, the phase 1 enclosure would have required 376 timbers 0.25m wide and the phase 2 enclosure 628 posts with a consistent diameter 0.15m. Such broadbrush calculations do not include additional support posts, those required for the buildings inside or indeed any scaffolding that may have been required. However, although these figures provide only a rough guide, they serve to illustrate the scale of timber resources necessary for constructing a palisaded enclosure. Clearly a considerable timber resource was required and on top of the other timber-palisaded sites known in the Till valley this implies that considerable clearance of what must have been extensive tree cover took place at the time of its construction. The squaring of the timbers for the phase 1 palisade is a relatively wasteful practice and so the use of undressed timber posts during phase 2 may have been employed as a more economical use of the then available timber resource. The use of narrow posts for the phase 2 palisade perhaps indicates the decreasing availability of more mature timber by this time. However, as only one small section of the defences was examined these conclusions must remain provisional. The presence of a single cereal grain in a lower fill of the phase 1 palisade ditch suggests that cereal production formed part of the economy on the site but it should be stressed that the presence of just one grain is insufficient to elaborate further.

HETTON HALL PALISADED ENCLOSURE

Introduction

The Hetton Hall enclosure (SMR number NU03SW48) survives as a buried sub-circular palisaded cropmark site (Fig. 5.32) with no surface remains visible above ground. The site is located at NU03453335 on an east-facing hillside on the dip slope of the Fell Sandstone escarpment. It is situated in a narrow valley formed by the junction of the scarp slope of one sandstone escarpment with the dip slope of another, and is drained by a series of tributary streams that feed into the south-flowing Hetton Burn which ultimately joins with the Till north of Fowberry. The enclosure lies on the 115m contour and commands views eastwards across Hetton Dene towards the outcrops of sandstone at Bowden Doors, Greensheen Hill and the Kyloe Hills to the north. The view to the west is restricted by the rising ground of the dip slope, whereas to the south the site affords views along the dip slope of the escarpment towards Chatton. The geology of the site consists of stagnogley soils (Payton 1980, 32) overlying undifferentiated till deposits containing shattered sandstone fragments, which in turn overlie Fell Sandstone bedrock. The site lies close to natural springs which occupy a band of ground between the 80m and 110m contours. The nearest stream lies 200m to the north, although the site may lie on a spring as a sheep wash had been located in the southern segment of the site.

The Hetton Hall site is a palisaded enclosure similar in size, form and layout to the Threecorner Wood site and other nearby excavated palisades such as Fenton Hill (Burgess 1984) and Horsedean Plantation (Miket 1986). Other palisaded sites, visible as cropmarks on aerial photographs, are known across the Till valley at Marleyknowe, Yeavering, Nesbit and one on Town Hill also at Hetton Hall. The enclosure measures approximately 90m by 70m and covers an internal area of 0.57 ha. The archaeological remains survive as negative features cut into the till deposits. The enclosure straddles the boundary between two fields and a linear plantation of pine woodland runs across its centre (Fig. 5.32). The site is roughly circular in plan (Fig. 5.33) and comprises a broad outer ditch with a narrower inner palisade trench placed concentrically inside the outer ditch. An entrance is visible through the outer ditch on the south-east side of the enclosure and a series of what appear to be post holes and a larger pit can be observed within, and immediately outside, this entrance on the aerial photographs. Their presence suggests a gateway arrangement associated with the outer enclosure ditch. Much of the central area enclosed by the palisade lies beneath the plantation and so detail of the interior is obscured.

Fig. 5.32. Aerial photograph showing the Hetton Hall palisaded enclosure.

Excavation

A single evaluation trench measuring 29m by 3m was opened across the highest part of the enclosure on its east side, encompassing the inner palisade trench and the outer ditch. After removal of the topsoil by machine and cleaning back the trench by hand these two archaeological features were visible together with a modern water pipe running across the east end of the trench (Fig. 5.34).

Features

Outer ditch

The outer ditch was sectioned and the resulting ditch profile recorded. The ditch had been cut with a steep v-shaped profile, being steeper and slightly convex on its inner edge. The ditch measured a maximum of 5m wide at the base of the modern ploughsoil and had a maximum depth of 1.6m from the base of the modern ploughsoil. As much soil erosion has taken place on the site, as evidenced by the substantial lynchet at the base of the field measuring up to 1m high in places, the ditch could have been perhaps 2.5m deep from the ground surface when it was originally cut. The ditch had two distinct fills: an upper fill (context 2) and a lower fill (context 7). The upper fill was a brown loamy clay-silt containing occasional sub-angular (frost-shattered) sandstone inclusions averaging 0.07m across. This homogeneous blocky fill was horizontally bedded, suggesting that it had been deliberately dumped in a single event and had not accumulated as a result of gradual siltation. Charcoal fragments were observed throughout the upper fill and a sample was taken from its base but subsequent assessment deemed this unsuitable for dating purposes.

Below the upper blocky fill was a series of thin, virtually indeterminate, lenses of basal ditch silts with a combined thickness of 0.6m. These silts were sloping towards the base of the ditch in a series of shallow lenses indicating that they had accrued more gradually over time as a result of natural inwash into the ditch. These basal silts (context 7) were very similar in colour and texture, being soft silty clays in shades of grey-brown. They had a softer texture than the upper fill (context 2) and fewer stone inclusions. Charcoal flecks were observed occasionally in the basal ditch silts but again none were considered suitable for dating purposes.

There was no evidence for any recut of the ditch although the extensive accumulation of ditch silts suggests that the site may have been occupied for a prolonged period. The apparent deliberate backfilling of the ditch with the horizontally bedded upper blocky fill raises the question of whether the site was deliberately levelled when it was abandoned or at some time after. Further excavation of a longer section of ditch and palisade trench would be required in order to establish whether the site was deliberately levelled on abadonment. No evidence of an inner bank or counterscarp survived in the section though it must be assumed that the upcast from the ditch had been

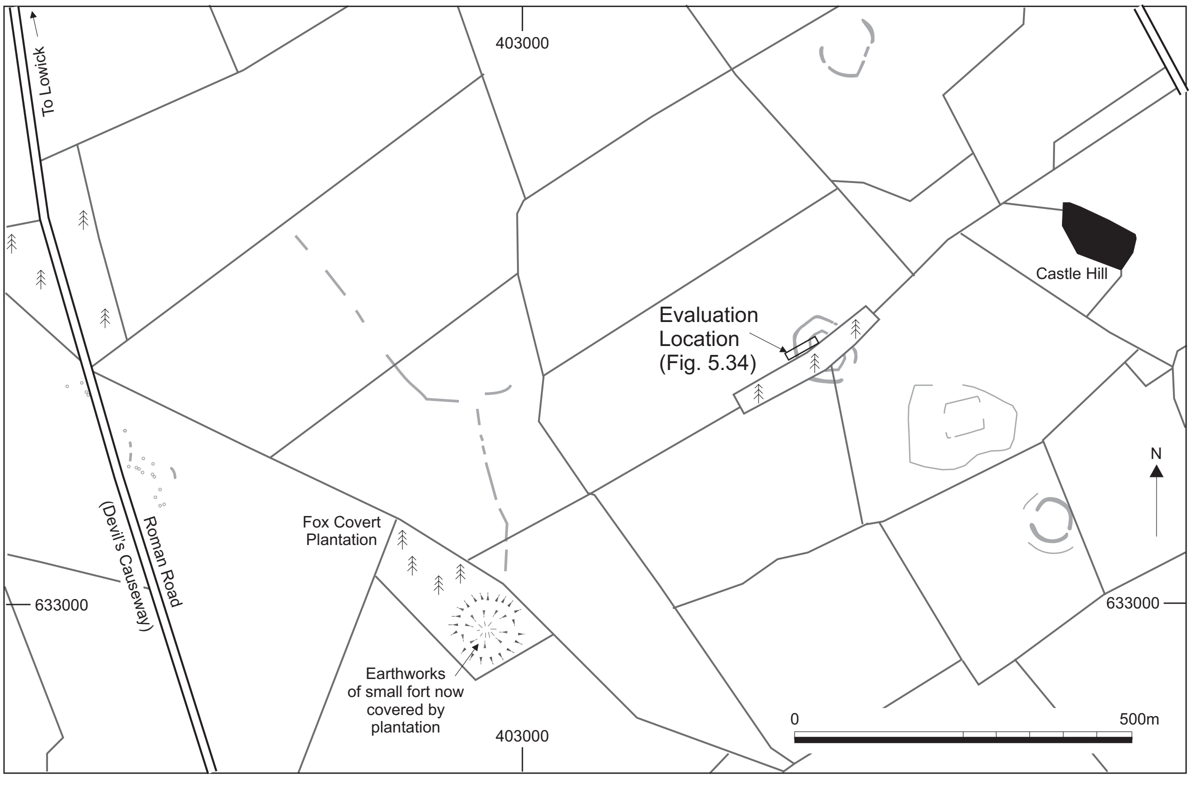


Fig. 5.33. Hetton Hall palisaded enclosure location plan.

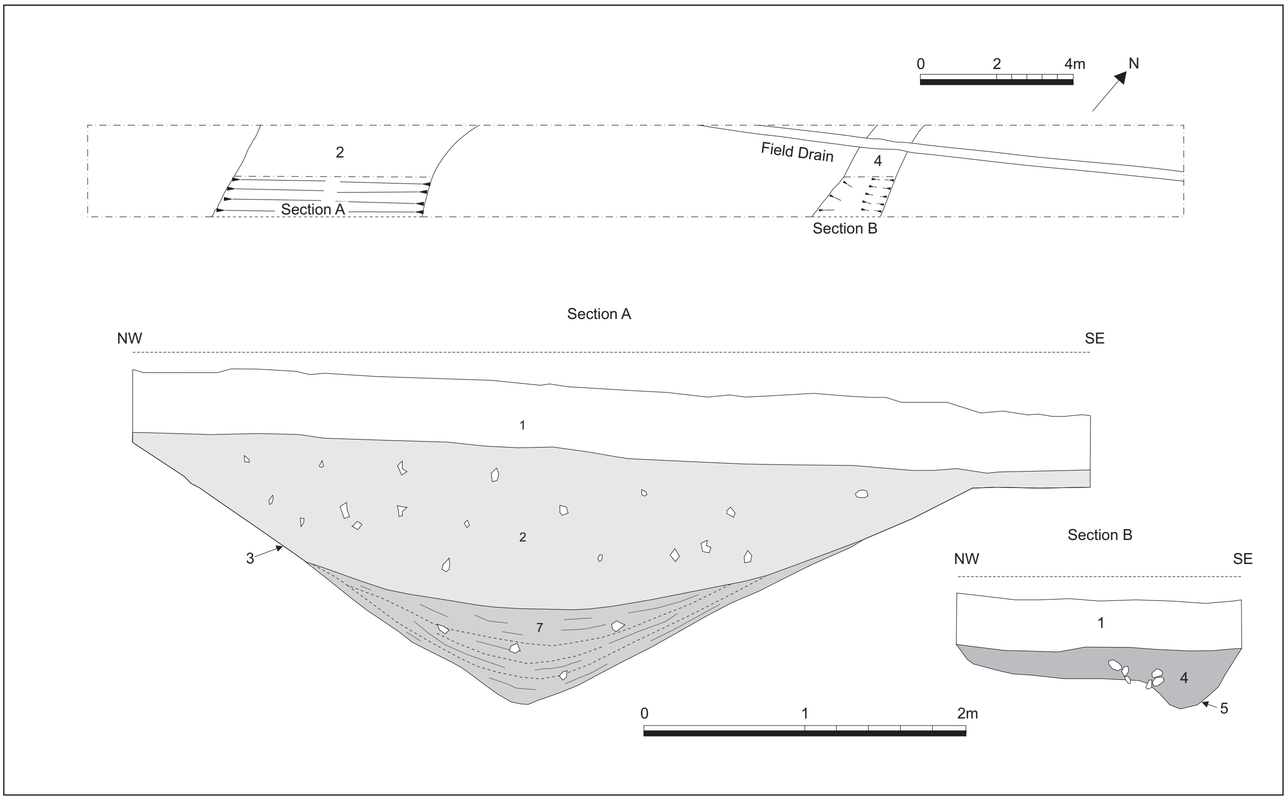


Fig. 5.34. Hetton Hall palisaded enclosure trench plan and section drawings.

primarily piled up on the inside of the ditch to form a defensive bank. The upper fill (context 2) is thought to be the redeposited ditch upcast material that had been pushed back into the ditch when the site was levelled, as it contains a similar clay fraction to the surrounding substratum, although it has a slightly higher silt and minerogenic content due to it being mixed with topsoil.

Palisade Trench

Set within the area enclosed by the ditch, an inner palisade trench was observed running across the trench. This feature is situated on the shoulder of the slope and has evidently experienced considerable truncation by ploughing activity and soil erosion. The lynchet which has formed at the east edge of this sloping field testifies to the significant loss of topsoil from the slope occupied by the enclosure. It is difficult, therefore, to reconstruct the original depth of the cut for this construction slot. The construction trench had a maximum width of 1.48m at the base of the modern ploughsoil. Running along the base of the east side of the construction trench was a more deeply cut continuous socket which contained a greater abundance of stones than the rest of the fill. This construction socket with stone packing is typical of the palisade slots found during excavation of the sites at Fenton Hill, Horsedean Plantation and Threecorner Wood. The palisade slot had a maximum depth of 0.34m from the base of the modern ploughsoil. Bearing in mind the considerable soil erosion that has taken place over this part of the field it can be estimated that this palisade slot had originally been cut somewhere in the region of 1–1.5m deep below the ground surface. Therefore the original palisade probably stood around 3m above ground, contributing to the defensive character of the site. The construction slot was virtually identical to the construction socket observed running along the base of the primary palisade trench at the Threecorner Wood site, both of which are thought to have held timbers between 0.2m and 0.25m thick. The profile of the trench consisted of a truncated concave cut with a steep-sided U-shaped socket cut into its base. The construction trench had a pale brown compact sandy clay fill (context 4) with occasional sub-angular stones throughout the fill averaging 0.08m across. The fill was loose in places, particularly around the lower constructional socket which is also where the stone content was concentrated.

A number of sizeable sandstone blocks were observed near to the palisade slot during removal of the topsoil; these had evidently been dragged from their original positions by the plough, considering the fresh plough marks visible on them. It was thought that some of these large stones (one measured up to 0.5m across) may have formed part of the original packing material in the palisade trench.

Examination of the field surface around the trench
The sown field surface around the area of the intended excavation trench was fieldwalked prior to the removal of topsoil. Unstratified finds included a flint blade tool, an agate end scraper, three agate flakes, a pottery sherd, a piece of field drain and a tiny fragment of clay pipe stem. The flint blade (Fig. 5.35) is made from a good quality brown-grey flint and is edge-trimmed along the length of one of its long sides. There are two narrow parallel-sided blade scars on the dorsal surface indicating the prior removal of two microlith-sized blades, suggesting that this piece may be of Mesolithic date. The piece has a maximum length, width and thickness of 26mm, 18mm and 8mm respectively. The agate end scraper (Fig. 5.35) is made from white and red agate and has abrupt retouch at the proximal end. End scrapers such as this are common in Mesolithic contexts and are processing tools usually associated with occupation sites. The scraper measures 27mm by 16mm by 13mm. The agate flakes are all small unretouched pieces of debitage with no diagnostic characteristics. One is a primary flake and the other two represent the secondary stage in the core reduction sequence. The smallest piece has a maximum length, width and thickness of 13mm, 8mm and 4mm respectively. The other secondary flake measures 17mm by12mm by 9mm. The primary flake measures 21mm by 24mm by 12mm. The pottery fragment (Fig. 5.35) is a small body sherd with sandstone grits. The uneven firing has given the pottery an orange coloured exterior and dark brown interior. There is no decoration apparent on this degraded piece although its fabric, thickness (9mm) and colour are typical of the later prehistoric pottery found across Northumberland.

Archaeobotanical Macrofossils by Jacqui Huntley and Jacqui Cotton

Samples were taken from the upper fill and the lower silts of the outer ditch as well as from the palisade construction trench fill but no charred remains other than degraded and unidentifiable charcoal flecks were found in the coarse sandy silt flots. The only waterlogged fragments were one fragment of *Chenopodium album* (orache) and two pine needles from the upper fill of the outer ditch (context 2). The latter are probably intrusive material from the pine plantation immediately adjacent to the ditch. The individual charcoal sample that had been collected from the upper ditch fill (context 2) bore characteristics similar to alder but no positive identification was possible due to the small size of the fragment.

Pollen by Tony Stevenson

Samples were taken from the upper fill (context 2) and lower silts (context 7) of the outer ditch for pollen analysis. However, on examination these samples contained very little pollen and that present was extremely degraded and mostly unidentifiable. One sample that did produce pollen was taken from the lower ditch silts (context 7) of the outer ditch which had almost certainly accumulated while the enclosure was occupied. Although all the pollen was degraded to some extent it was, nonetheless, preserved sufficiently well to allow 97 pollen grains to be identified. The pollen assemblage indicated a largely open landscape with grasses, including cereals, ruderals, ferns and sedges.

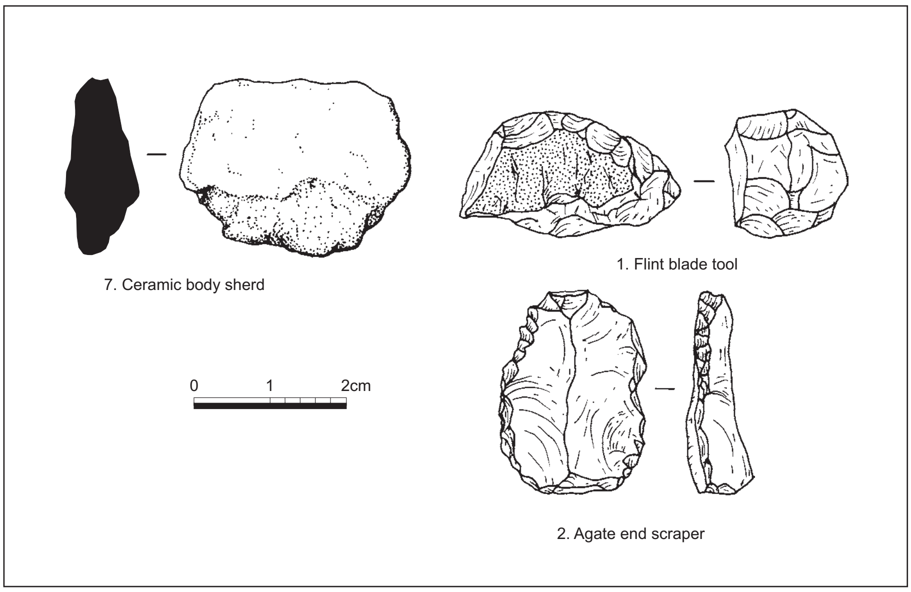


Fig. 5.35. Small finds from Hetton Hall palisaded enclosure.

Discussion

The evaluation confirmed that this monument was indeed a palisaded enclosure with a substantial external v-shaped ditch. Although there was no physical evidence of a surviving bank it is thought that the outer ditch had an associated earthen bank on its inside, formed by the ditch upcast, which was subsequently pushed back in to fill and level the ditch when the site was abandoned. As with the Threecorner Wood site, this enclosed site is probably best conceived as a fortified farmstead for an extended family group. The scale of the defensive features indicates that this settlement was defended not just for purposes of status or ostentation but for effective physical defence. The siting of the palisade is strategic: it occupies a shelf on the hillside with extensive views up and down the valley to the north and south. The scanty pollen evidence from the primary ditch silts of the outer ditch suggest a mixed farming economy with cereal cultivation as well as land given over to pasture. Although no direct dating evidence is available, its direct analogy with the nearby site at Fenton Hill means it can be fairly assumed that the Hetton Hall enclosure dates to broadly the same period and therefore probably belongs to the early-mid first millennium cal BC.

The Hetton Hall enclosure is situated amidst a wealth of archaeological sites spanning different periods. Indeed the small sheltered and fertile valley occupied by the Hetton Burn has evidently been a focus for human settlement over millennia. To the east, lithic evidence for Mesolithic occupation at rock shelter sites around Bowden Doors has been discovered (Waddington 1999b). A carved stone ball, typical of the Neolithic repertoire in North-East Scotland, has been found at Hetton (Speak and Aylett 1996) and the many cup and ring marked outcrops on nearby Dod Law, Horton Moor, Buttony and Fowberry are also indicative of Neolithic activity (see Bradley 1997; Waddington 1998b). The cropmark palisaded sites at Hetton Hall and the nearby enclosure 400m to the south-east on Town Hill may represent Late Bronze Age or Iron Age fortified farmsteads. A small hillfort in the Fox Covert plantation comprising an ovoid earthwork enclosure is located 450m to the south-east of the Hetton Hall enclosure and is typical of the small Iron Age defended sites of the Borders. The intensive Iron Age settlement of this area of sandstone escarpment is further attested by the hillforts at The Ringses, Horton Moor, Dod Law and Buttony situated 1.5km, 1.75km, 2.75km and 2km from the Fox Covert fort respectively. Romano-British activity is represented by the Roman road known as the Devil's Causeway that runs north to south along the sandstone escarpment 1km to the east of the Hetton Hall palisade, linking the fort at Learchild in the Aln valley to an as yet unknown station near Tweedmouth. A large probable Roman temporary camp is located at the south end of the valley at Horton close to the bridging point of the River Till (Gates and Hewitt 2007). Recently, Bishop (Mike Bishop, pers comm) has argued that this road has pre-Roman origins, suggesting that the Hetton Hall palisaded site may have been located close to an important prehistoric north to south communication route. Evidence for Romano-British native settlement includes the rectilinear enclosure located immediately next to the Hetton Hall palisade on its south-east side. Possible post-Roman settlement is suggested by the rectangular buildings that overlie the hillfort defences at The Ringses although these have not been directly dated. The Hetton Hall palisaded enclosure thus lies within a long sequence of human settlement concentrated on an attractive hillside within a fertile tributary valley.

FLODDEN HILL RECTILINEAR ENCLOSURE

Introduction

The Flodden Hill rectilinear enclosure (SMR number NT93NW23) survives as a cropmark site visible on aerial photographs but with no surface traces visible above ground. The site is centred at NT92003610 on a south-east facing slope on the northernmost flank of the Cheviot Hills. The site enjoys a sunny aspect to the south and east and is sheltered from the worst of the prevailing westerlies by Flodden Hill. Although the view to the west is restricted by the rising ground to the rear of the site, this location commands an otherwise panoramic view across the Milfield Basin to the sandstone escarpment and the Cheviot range to the south. Approximately three quarters of the site is situated in a cultivated field and the other quarter lies below the linear plantation known as Flodden Strip. The field is intensively farmed and is under a cycle of wheat and potato cultivation. The underlying drift geology consists of andesitic till deposits comprising frost-shattered andesite and dolerite (whinstone) set in an orange-brown clay matrix. The soil is a typical brown earth and is moderately stony. It drains well as it overlies stony andesitic drift material. The site straddles the 80m contour and lies immediately adjacent to wet ground resulting from a natural spring. No previous archaeological work has been undertaken on the site although it was noted by Miket in his thesis on the region (1987, 239–251) along with the other rectilinear settlements in the valley.

The cropmark evidence shows a rectangular enclosure with a single ditch (Fig. 5.36) together with an entrance on its eastern side. The northern side of the enclosure is not visible because it lies beneath the Flodden Strip plantation. The orientation of the site is of interest as the entrance lies on the downslope side of the enclosure pointing towards the valley floor below. What is more, the Roman road that passed through the valley, and which the route of the modern A697 road is likely to mirror (Mike Bishop, pers comm), runs through the valley below the site in direct view to and from it. Clearly, this enclosure was constructed so that its attention was focused towards this communication artery. Some parchmarks could be observed within the enclosure, suggesting the existence of internal features, but these were somewhat amorphous. The dark patches appear to be suggestive of cut features while the lighter parchmarks appear to represent structural features that have inhibited crop growth. The enclosure measures approximately 65m long externally. The width is not known with certainty although assuming the entrance lies in the centre of the east side the width can be estimated at being in the region of 55m. This enclosure size sits happily within the size range of rectilinear enclosures in the Milfield Basin, observed by Miket (1987, 244) as ranging from 50–90m in length by 30–65m in width internally. The ditch has a consistent width and measures up to 5m across. The internal space enclosed by the ditches of the Flodden Hill enclosure is around 0.3 ha. If a width of 5m is included for an internal bank, as found at Tower Knowe (Jobey 1973) and Belling Law (Jobey 1977), together with a berm separating bank from ditch of *c.*1m, then the area available for habitation at the Flodden site is *c.*0.25 ha.

Excavation

A trench with maximum dimensions of 23m by 16m was opened over the entrance and part of the interior of the enclosure to include both terminals of the

Fig. 5.36. Aerial photograph showing the Flodden Hill rectilinear enclosure.

outer ditch either side of the entrance (Fig. 5.37). The modern turf and topsoil were removed by machine and the remaining contexts cleaned and excavated by hand. The topsoil has been systematically ploughed so any archaeological remains within this horizon have been obliterated. On cleaning back, some shallow upstanding archaeological features could be seen to survive immediately below the ploughzone (Figs 5.38–39) in a subsoil horizon that survived discontinuously over the site. These features consisted of an area of laid cobbles and a metalled surface leading through the entrance of the enclosure up to the cobbled area. Apart from these features the only other archaeological features that could be identified in the trench were the terminals of the outer ditch (Fig. 5.38). The upper layer of the ditch within the ploughzone has been truncated but the rest of the ditch deposits survive intact. The eastern downhill end of the site has suffered from greater truncation than the upper part of the site. This is because the interior of the site had been partly scooped into the hillside to create a more level area and hillwash deposits have covered this scooped area to produce a greater thickness of topsoil, thus providing protection from the ravages of the plough. The topsoil measured between 0.4 and 0.5m deep, consisting of dark grey clay silt with occasional angular stone inclusions. The subsoil, which measured up to 0.1m thick, was a brown colour with a higher clay fraction, but also containing occasional angular stones.

Two small purple agate flakes and a broken beige chert flake were recovered from the unstratified topsoil. Two of the flakes were broken but the remaining agate flake measured 14mm long, 11mm wide by 5mm thick. None of the pieces have been retouched or modified or show any diagnostic characteristics. All

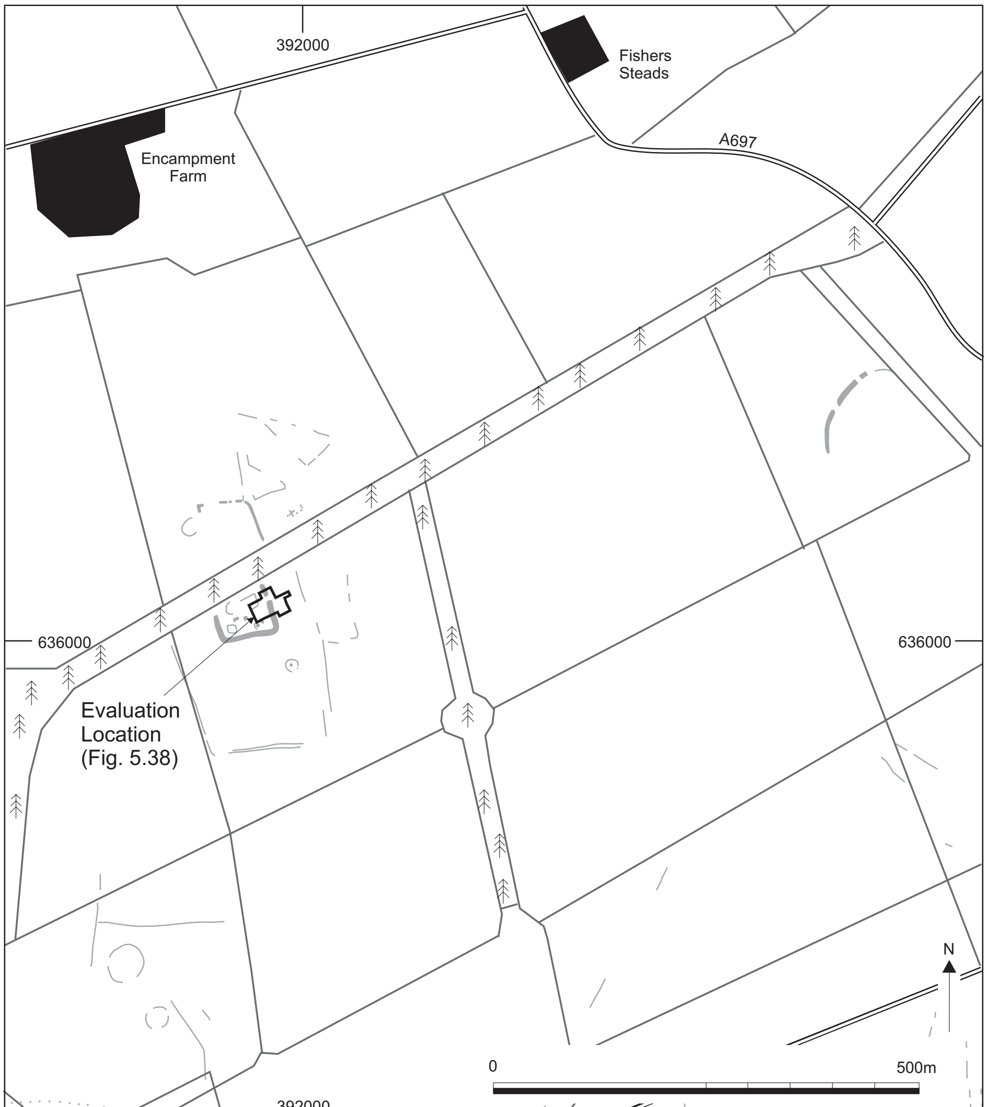
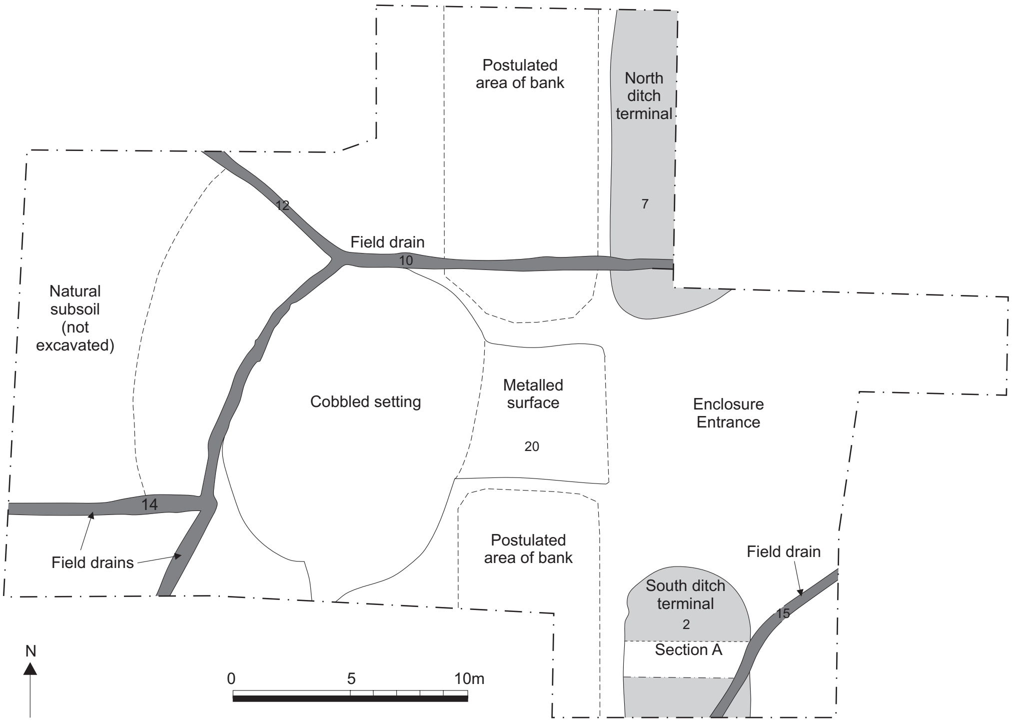


Fig. 5.37. Flodden Hill rectilinear enclosure location plan.



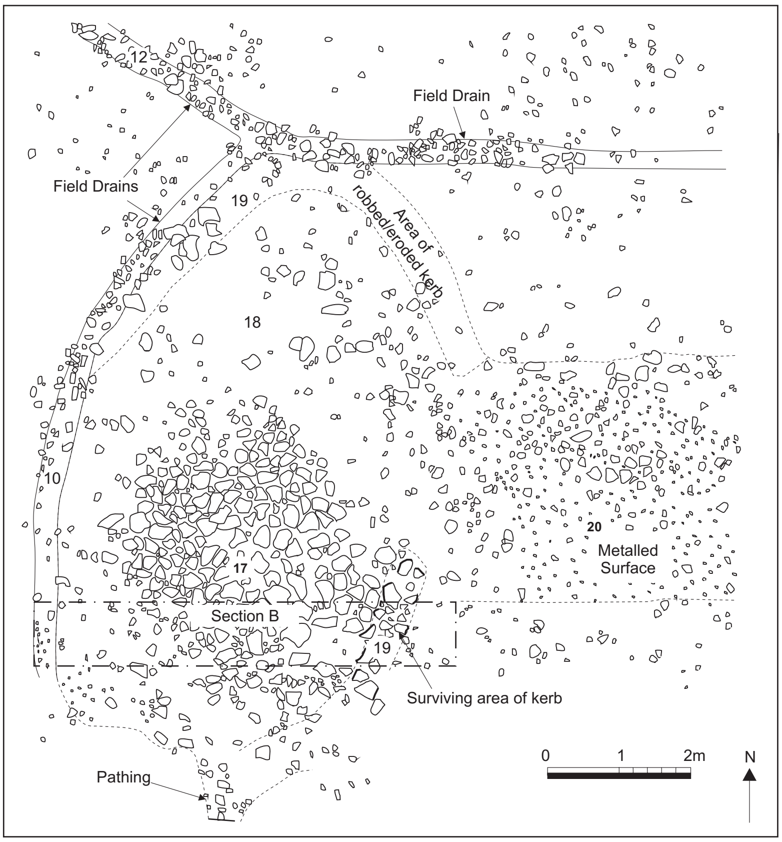


Fig. 5.38. Flodden Hill rectilinear enclosure trench plans

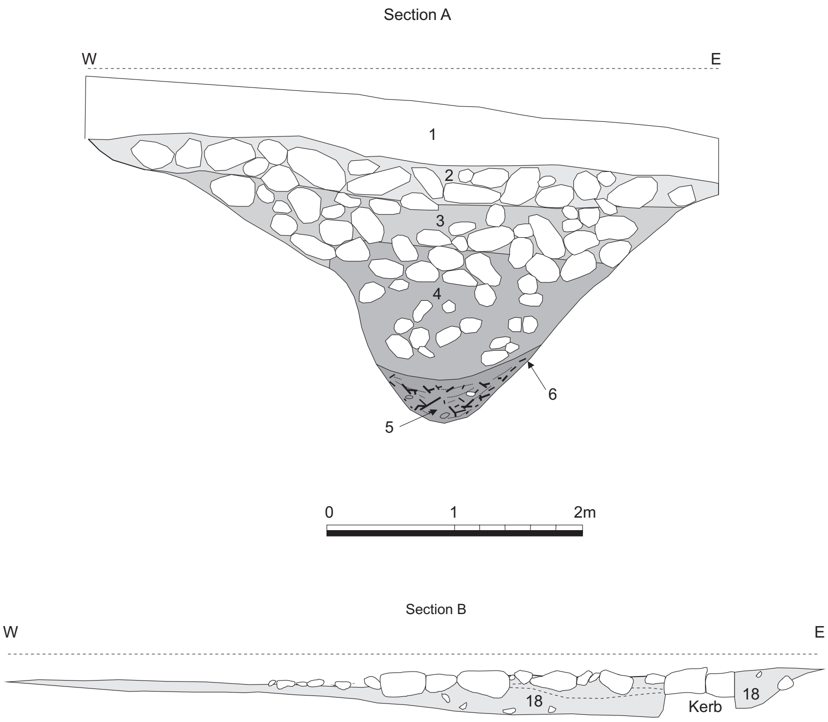


Fig. 5.39. Flodden Hill section drawings.

the lithics were made from locally available material. In addition, two tiny sherds of what appears to be Romano-British pottery were also retrieved from the topsoil. One sherd is extremely tiny and cannot be characterised while the other is a small body sherd. Both have a distinctive thin gritted fabric, light orange in colour. The body sherd had a thickness of 5mm. The two small sherds of pottery are likely to have come from activity associated with the rectilinear enclosure, whereas the presence of lithics suggests earlier prehistoric activity at or near this site.

Features

Outer Ditch

Both ditch terminal fills could be observed as slightly darker fills set into the orange-brown underlying andesitic till substratum. Both have been truncated by ploughing and this has also removed any upstanding evidence for the existence of an inner bank. The north ditch terminal was marked on the plan but was not excavated. The south ditch terminal was more fully exposed and a section was cut across it. The upper fills were excavated by hand, but as it became clear that the basal deposits of the ditch were waterlogged this made collapse of the sections imminent, particularly as the upper fills contained substantial heavy boulders, thereby posing a safety risk. It was decided to excavate the basal section of the ditch by machine in order to cut a box-section across the ditch in its lower part. This approach was successful as it allowed the profile of the ditch to be accurately recorded before the sections collapsed. Bulk samples of the basal waterlogged ditch fill (context 5) were collected by hand from the section edges once the machine had finished boxing out the section and prior to the collapse. The digger cut revealed a very clear section which showed that the ditch had a single original cut (context 6) with no later re-cuts evident. The profile of the ditch was not uniform as it had a single continuous concave profile on the outer edge and a stepped convex profile on the inner edge (Fig. 5.40). The ditch measured 5.15m in width at the beginning of the archaeological horizon and 2.07m deep from this point. Assuming a similar depth of topsoil existed when the site was occupied as exists today this would give the ditch a total depth of around 2.5m and a projected width of around 6m at ground level when originally constructed. In plan both ditch terminals tended more towards square than rounded ends, and both had regular straight sides an even distance apart.

The upper fill of the ditch terminal (context 2) consisted of a boulder fill set in a loose and gritty silty clay matrix, brown in colour. Although this material evidently derived from the original ditch upcast, the rocky character of this fill and the presence of voids within it suggested that it was sorted material consisting mostly of rocks and boulders picked out from the upcast till, or perhaps from a nearby quarry, with only some of the clay-silt matrix backfilled with it. The fill comprised at least 50% stone, which ranged from small stones a few centimetres across to large boulders over 0.5m across. This layer was horizontally bedded,

Fig. 5.40. The Flodden Hill rectilinear site under excavation.

showed no indication of weathering or siltation and was homogeneous. None of the stone showed evidence of having been dressed, although its presence in the upper fill suggests that it probably came from the enclosure bank which, on account of the horizontal bedding, absence of siltation and homogeneous character, appears to have been pushed into the ditch to deliberately level the site after its abandonment. The existence of voids between stones and the loose nature of the fill is consistent with deliberate backfilling rather than natural infilling due to slumping, siltation or collapse. Indeed the sorted appearance of this fill gives good grounds for viewing this material as having perhaps derived from a drystone revetment constructed from the stones and boulders thrown up by the original ditch upcast. This fill measured 0.35m deep from the beginning of the archaeological horizon and had evidently been truncated above this level. The farmer also commented to the excavators on the stony character of this part of the field.

Below the upper fill was a clay silt fill (context 3) consisting of a stiff, fine clay, light grey in colour with a blue tint indicating that it had gleyed. The high clay content in this fill may be, in part, due to migration of clay fractions from the fill above. Context 3 was also horizontally bedded, homogeneous in form and contained no evidence for siltation down the side of the ditch or *in situ* weathering. This deposit also appears to have been deliberately used to backfill this ditch and probably derives from redeposited upcast material. This layer measured a maximum of 0.65m thick. Below context 3 was a lower clay fill (context 4) consisting of a loose grit and clay that contained *c.*20% medium sized stones averaging 0.2m across. This fill was also horizontally bedded with no evidence of siltation or having weathered, suggesting that this was also deliberate backfill. This layer had a maximum thickness of 0.75m. As no hiatus could be observed between any of these upper ditch fills, all were horizontally bedded and none showed any signs of siltation or weathering, it can be concluded that they resulted from one single backfilling event, undertaken in an ordered manner. This implies that abandonment of this site was abrupt, organised and included the levelling of the enclosure so that it was of no further use.

Below fill 4 was a basal ditch deposit (context 5) comprising a black clay-silt waterlogged fill. This fill is the primary ditch deposit which appeared as one block of homogeneous dark sloppy silt, although siltation lenses were observed in the section before the trench re-filled with water. It had a high organic content that included waterlogged wood. Occasional small stones up to 0.1m across were encountered in the fill. The silt was not horizontally bedded but sloped upwards at its sides indicating that it had formed naturally and was not a dump. These were the natural ditch silts at the base of the ditch. They had a maximum depth of 0.37m to the base of the ditch although most of the deposit only measured

0.15m thick. The silt contained charred barley seeds, waterlogged branch wood and herb plants typical of disturbed ground used for pasture and nearby cultivation (see below), together with invertebrates indicating a climate significantly warmer than today (see below). This basal ditch deposit does not appear to have formed over a protracted period (see invertebrate section below) suggesting that the site was abandoned after only a relatively brief life.

Metalled Track

The linear metalled surface (context 20) led through the enclosure entrance straight to the area of cobbled standing (context 17). The metalling measured 4.4m long from the entrance to the cobbled area and had a regular width of 3.2m and depth of 0.1m. The surface consisted of small sub-angular andesite and dolerite chippings averaging 40mm across, rammed into the same clay matrix (context 18) as the cobble setting and occasionally set directly into the underlying natural till. This surface had been truncated in patches but otherwise survived intact. Linear depressions could be observed in this surface leading up to the cobble setting and these are almost certainly the remains of cart tracks from wheeled vehicles. As many grooves were visible it was not possible to confidently match up any pair in order to measure the axle width of the vehicles used.

Cobbled Standing

An ovoid cobble setting (context 17) measuring 8.6m by 6.1m was exposed immediately inside the entrance of the enclosure (Figs 5.38–39) in the area shown as a parchmark of stunted crop growth on the aerial photographs (Fig. 5.36). The cobble setting was of solid construction consisting of rounded dolerite cobbles averaging 0.3m across set in clay (Fig. 5.41). This cobbled area of hard standing was inset into a level area cut into the sloping hillside to produce a relatively level interior to the enclosure. A discontinuous kerb (context 19) was observed around the cobbled area on its east side although it did not continue over the meeting of the metalled track with the cobbled standing. Frequent ploughing up of rounded cobbles in this area of the field was recalled by the farmer who visited the excavations and this, together with the disturbance by field drains, would account for the occasional missing stones in and around the edge of the cobbled area. With the cobbled area being ovoid in shape and located immediately within the entrance area of the enclosure at the end of the metalled surface with cart ruts, it is best understood as an area of hardstanding that may have formed a turning and un/loading area for carts. The levelled area behind this cobbled standing that extends round to its east and west is more likely to have been occupied by structures, and the little area of paving leading off from the cobbled standing on its south side is suggestive of a

Fig. 5.41. View of the cobbled setting inside the entrance at the Flodden Hill enclosure.

building in this area of the enclosure. The area behind the cobble setting did not have the subsoil stripped back due to time constraints, and so the presence of a structure in this part of the site could not be tested, and in any case the remains of timber structures may have completely disappeared as a result of truncation and the rotting of timber in these soils. A section was cut by hand across the cobbled standing in an east to west direction. This showed that the cobbles were set in a deliberately laid clay matrix and revetted by a kerb. This well-built surface had been constructed so as to withstand considerable stresses – hence its good state of preservation. The ground surface on which it was built had been levelled by the removal of the existing topsoil and the clay and cobbles had been laid directly on to the till substratum.

Field Drains

Four field drains were observed running through the excavation trench. One ran around the north and west sides of the cobble setting where it had been inserted against the edge of the cobbling, disturbing the setting in this area and accounting for the lack of kerb around the west side of the cobbled surface. All the drains were of the same construction, measuring 0.35m across with a stony fill of angular stone chips. The farmer mentioned that at around this level of the field it was often quite wet and many drains were needed to remove surface water due to the presence of a spring.

Radiocarbon Dates
by Alex Bayliss and Clive Waddington

Two single-entity samples of alder (a short-lived tree species) were extracted from the waterlogged basal fill (context 5) of the enclosure ditch and submitted for radiocarbon dating at the Oxford Radiocarbon Accelerator Unit in 2001, processed according to methods outlined in Hedges *et al.* (1989), and measured using Accelerator Mass Spectrometry (Bronk Ramsey and Hedges 1997).

The two results from Flodden Hill are statistically consistent ($T'=0.4$; $T'(5\%)=3.8$; $\nu=1$), and suggest that the enclosure may be of late Iron Age or possibly very early Roman date. It should be noted that the samples from which these dates were acquired were from alder fragments and therefore likely to have been several years old, perhaps up to a decade, when they became incorporated into the fill. Therefore, the dates are probably marginally earlier than the primary construction of the ditch and at this period on the calibration curve 10 radiocarbon years can make a significant difference in the calibrated result. Hence an Early Romano-British attribution is possible. Although some have been shown to have Iron Age antecedents as rectilinear palisaded sites, most of the other rectilinear enclosures of the Borders have been shown by excavation to typically date from the Romano-British period (Jobey 1973; 1977; 1978) and these dates are potentially consistent with this scheme. However, what is of interest with this suggested dating is that the *terminus post quem* provided by the dates for the backfilling of the ditch could suggest that this apparent leveling of the site could correspond with the new evidence emerging for the initial Roman advance into the north which is now known to have occurred in the early 70s AD or possibly earlier (Shotter 2000). The idea of the Roman advance thrusting up the east side of the Cheviots through Votadinian territory in close contact with the coast receives further support from the recognition of Flavian period Samian Ware pottery from the Romano-British rectilinear settlement at Murton High Crags (Jobey and Jobey 1987, 172) in the lower Tweed valley further to the north-east.

Archaeobotanical Macrofossils
by Jacqui Huntley and Jacqui Cotton

A bulk sample from the basal fill of the ditch (context 5) was initially assessed by Jacqui Cotton and subsequently fully analysed by Jacqui Huntley. Although clearly waterlogged, the sample was nonetheless subjected to manual flotation in order to try to concentrate any charred material present. Whilst the waterlogged remains would be expected to relate to local conditions, it is charred material that is most likely to reflect usage of cereals and associated crop husbandry practices.

Assessment of context 5 produced a flot dominated by an organic matrix, indicative of anaerobic, waterlogged conditions. A large number of waterlogged seeds was present in the flot, most of which represent species found in waste ground, grassland, or cultivated ground. Species from wetland or damp environments were also present. These data suggest that the context was a damp area of ground, surrounded by cultivated and/or disturbed land. The presence

Context	Material	Lab No	Radiocarbon Age BP	$\delta^{13}C$ (‰)	Calibrated date (95% confidence)
Basal ditch silt (context 5)	Waterlogged alder	OxA-10632	2032±36	-26.2	170 cal BC–cal AD 60
Basal ditch silt (context 5)	Waterlogged alder	OxA-10633	1999±34	-26.3	90 cal BC–cal AD 80

Table 5.17. The radiocarbon dates from the Flodden Hill enclosure.

of only two barley grains in a flot of 485ml does not indicate that grain was processed or stored near to the site. Waterlogged wood from the same context was identified as *Alnus* spp. This species is short lived, and the fragments identified were all branch wood with a diameter of less than 40mm.

Ten litres of highly organic material were processed by manual flotation to 500µ and all of the material fully analysed. Identifications were by comparison with modern reference material held in the Department of Archaeology, University of Durham. Charred remains were counted but waterlogged material was scored on a 5-point abundance scale (1=the occasional individual to 5=dominant, many hundreds of remains). Nomenclature follows Stace (1997). The term 'seeds' is used loosely to refer to botanical fruits as well as seeds.

The bulk of the flot was a fine amorphous organic material containing fragments of stem, epidermis and leaf material with small amounts of *Calluna* (heather) shoots and the occasional heather flower. A few leaves of *Sphagnum* moss, frond fragments of *Pteridium aquilinum* (bracken), miscellaneous wood and twigs occurred as well as invertebrate remains (see below), caddis larval cases and *Daphnia ephippia*.

The assemblage was dominated by remains of *Sonchus asper* and *Urtica dioica*, both species being perennial and characteristic of nutrient-enriched waste ground. *Rumex* spp was also common and, likewise, represent the same habitat. Other particularly abundant taxa included *Stellaria media* and *Montia fontana* ssp. *minor*. The former is a typical weed on disturbed soils and amongst crops, whilst the latter favours wet, muddy areas such as cattle-poached ground around ponds and drinking places. Wet taxa do not reflect true aquatics although both *Montia fontana* and *Ranunculus sceleratus* can withstand very wet situations. Therefore, although *Daphnia* and caddis remains indicate that standing water was present, the plant remains only indicate wet sediments. The few charred remains simply indicate that both emmer wheat and hulled 6-row barley were being used by the occupants of the site at the time of ditch infill – both taxa are typical of sites of this period in the region (Huntley and Stallibrass 1995).

Overall, the plant remains by themselves indicate that the ditch was wet but did not necessarily contain open water; that the sides and possibly ground for some distance around was heavily vegetated by

Latin taxon		**score**
Sonchus asper	Prickly sow thistle	5
Urtica dioica	Stinging nettle	5
Stellaria media	Chickweed	3
Montia fontana ssp. minor	Blinks	3
Rumex obtusifolius-type	Docks	3
Rumex longifolius perianths+nutlets	Northern dock	2
Chenopodium album	Fat hen	2
Polygonum aviculare	Knotgrass	2
Persicaria maculosa	Redshank	2
2-4mm Gramineae	Grasses	2
>4mm Gramineae	Grasses	2
Pteridium aquilinum frond fragment	Bracken	2
Cirsium sp	Thistles	2
Lamium spp	Dead nettles	2
Ranunculus sceleratus	Celery-leaved buttercup	2
Carex (trigonous)	Sedges	2
Ranunculus flammula	Lesser spearwort	2
Isolepis setaceus	Bristle club-rush	1
Galeopsis tetrahit	Hemp nettle	1
Persicaria lapathifolia	Pale persicaria	1
Urtica urens	Annual nettle	1
Ranunculus repens-type	Buttercups	1
Viola sp	Violet	1
Raphanus raphanistrum podd fragment	Radish	1
Rumex conglomeratus perianth	Clusetered dock	1
Rumex obtusifolius perianth	Broad leaved dock	1
Charred remains		Count
Hordeum L. – hulled grain	Barley	1
Hordeum L. – 6-row rachis node	Barley chaff	1
Hordeum L. – basal rachis node	Barley chaff	1
Triticum dicoccon Schrank. – glume base	Emmer wheat chaff	2
Polygonum aviculalre	Knotgrass	1

Table 5.18. Summary of archaeobotanical macrofossil results from the Flodden Hill enclosure ditch.

ruderals, particularly sow thistles and nettles, but that more open ground, possibly even actively cultivated, was also nearby. The soils were nutrient-enriched but whether deliberately so for cultivation or simply because of occupation by people and animals is not possible to determine. The fact that the invertebrate remains (see below) give strong indications for standing water could seem contradictory to evidence from the plant remains. However, a plausible explanation is that the ditch did contain standing water but that it was equally kept clear of vegetation, although the sides and top were allowed to become vegetated. Thus the importance of looking at several lines of evidence together becomes clear.

Insect remains

by Harry Kenward

Introduction

A single sample of sediment from the waterlogged basal ditch fill of the enclosure (context 5) was submitted for assessment of insect remains. The remains clearly had considerable potential for local ecological reconstruction, and included at least one species with significant climatic implications. Detailed analysis was therefore undertaken.

Methods

After brief description following a standard *pro forma*, a subsample of 2.0 kg was submitted to sieving and full paraffin flotation, following the methods described by Kenward *et al.* (1980). No further raw sediment was available for the phase of detailed analysis so, in order to search for climatic indicators and synanthropes, the dried residue from a bulk-sieved sample processed at the University of Durham was wetted then boiled to expel air, then subjected to paraffin flotation.

Results

The sample of raw sediment was described in the laboratory as moist, dark brown slightly sandy silty amorphous and detrital organic material, with some stones up to 50mm across. Five ml of organic matter was recovered in the flot, and most of this was fragments of insects. Preservation was superb (modes E1.5, F 2.0, following the scheme of Kenward and Large 1992), and there were many entire, or nearly entire, sclerites of even large species such as dung beetles, chafers and silphids, as well as the delicate nymphs of bugs. A very large flot (about 50ml) was recovered from the bulk-sieved material and this, too, was rich in insect remains. The species recorded from the two subsamples are listed in Table 5.19, and species lists by subsample are given in Table 5.20 (numbers of individuals for the 2kg subsample and non-quantitative record of additional taxa for the bulk sieved subsample). Statistics concerning ecological groups are given in Table 5.21, and the ecological groups are defined briefly in Table 5.22.

Because this is a primary fill it is very likely that it accumulated while the site was in use and not after abandonment. This is supported by the strong indications of an open environment (see below). It is therefore considered safe to use the fauna to reconstruct conditions at the site in its use phase. The following account is based on remains recovered from the 2kg raw sediment sample (numbers of individuals are for this), but the results from the bulk sample have been drawn on where appropriate ('BS'). It should be noted that many species mentioned below as being represented by one or a few individuals were present in larger numbers in the bulk sample, suggesting that they lived close by and were not 'background fauna' which had travelled long distances.

Main statistics for the assemblage of adult beetles and bugs are given in Table 5.21. In general terms, this was a very species-rich fauna (alpha of Fisher *et al.* 1943 = 121, SE = 13), mostly reflecting open-air habitats (63% of individuals and 61% of taxa falling in the 'outdoor' category, 'OB' in Table 5.22, being unable to live in buildings or artificial accumulations of decaying matter). Species associated with decomposing matter (RT) were poorly represented by comparison with occupation deposits *sensu stricto*, making up a third of the fauna; of this component about a third again was contributed by species usually found in dung and other very foul matter (RF). Synanthropes (species favouring intensive human occupation, excluding those associated with farmland *etc.*, SA in Table 5.22) were rare (11%), and species associated with farmland very rare (ST: 2%). There were no insects dependent upon human dwellings or other structures (SS).

Conditions in the ditch

That the deposit formed in water was clear from the presence of a range of aquatics. These included abundant ephippia (resting eggs) of cladocerans (water fleas), principally a form identifiable as *Daphnia* sp., but including at least three other species. There were appreciable numbers of a range of aquatic beetles and bugs (21 species, 39 individuals). The latter were almost all species which would be at home in shallow, reasonably clean water with a little vegetation, and not necessarily permanent. The more abundant were two small *Helophorus* species (8 and 2), *H. aquaticus* (3), *Limnebius truncatellus* (3), a corixid bug (2), *Hydrobius fuscipes* (2) and *Ochthebius minimus* (2). Duckweeds (*Lemna*) are suggested by the weevil *Tanysphyrus lemnae* (BS). There were remains of two species of elmid beetles, indicative of flowing water: *Esolus parallelipipedus* (two individuals) and *Oulimnius* sp. (one). These may have come from a clean, permanent stream inflow, but seem more likely to have arrived on the wing as 'background fauna' (*sensu* Kenward 1978).

There were a few waterside taxa, none of them abundant. Among the ground beetles, *Pterostichus nigrita* (2) is particularly associated with litter by water, as is the hydrophilid *Cercyon ustulatus* (Hansen 1987; BS). *Trechus secalis* and *T. rubens* (both from the bulk sample) are found in shady and damp places. The rove beetles *Lesteva longoelytrata* (2), *Platystethus nitens* (3) and *P. nodifrons* (BS) are typically found on waterside mud. There were several other species likely to be found at the edge of the water in a ditch, among them some plant-feeders and ground beetles. The plant-feeders included *Chrysolina staphylaea*, a leaf beetle generally found in damp places and associated with plants such as *Mentha* spp. and *Veronica beccabunga* L. (Hansen 1927). Similarly, *Phaedon tumidulus* lives on various umbellifers (Greenwood 1996), very often by water or in damp places. Among the 'froghoppers', *Aphrodes flavostriatus* (2) is found on grasses in damp places and *Megophthalmus ?scanicus* (3) is also associated with grasses (Le Quesne 1965). The weevil *Notaris acridulus* (BS) is typical of waterside vegetation.

The immediate surroundings

It seems that the immediate surroundings of the ditch supported a flora of perennial weeds. A range of species typical of well-established beds of stinging nettles (*Urtica dioica* L.) was recorded. These included: *Brachypterus glaber* (13 individuals, the most numerous beetle, and a nettle feeder); *Scolopostethus ?affinis* (5 individuals, a ground bug typical of nettle beds but not confined to them); *Cidnorhinus quadrimaculatus* (3, a weevil almost entirely confined to nettles); *Trioza urticae* (2 adults and numerous nymphs, a nettle-feeding 'plant louse'); and *Heterogaster urticae* (a single individual, the 'nettlebug', well to the north of its normal range in Northumberland, see below). This fauna suggests well established and little disturbed clumps of nettles of substantial size, perhaps at least a metre or more across, in a sunny spot. The plants may well have grown on the banks of the ditch.

Other insects associated with particular perennial weeds were recorded. There were three *Gastrophysa viridula* (a leaf beetle found on docks and their relatives, *Rumex* and *Polygonum*), and *Chaetocnema concinna* (1) and *Rhinoncus pericarpius* (BS), both also associated with *Rumex* and *Polygonum*. There were single individuals of *Phyllotreta nemorum* group (found on various crucifers) and *Crepidodera ferruginea* (on a range of herbaceous plants). *Gymnetron labile* (1) and *Mecinus pyraster* (BS) both live on plantains, *Plantago*, and *Alophus triguttatus* (BS) is a polyphage with a preference for plantains (Morris 1997). The various *Apion* were probably of species associated with clovers and vetches. Some other polyphagous plant feeders were recorded, for example the 'cuckoo spit' bug *Philaenus spumarius* (3), and the froghoppers *Aphrodes* spp. (3+2). The ladybird *Rhyzobius litura*, a typical denizen of rough herbaceous vegetation, was also present (1).

Many of the other species recorded probably lived on the ground or in litter below these weeds, for example the ground bugs *Stygnocoris pedestris* and *Drymus sylvaticus* (one of each); most of the ground beetles, *Tachyporus* and *Tachinus* species, and *Micropeplus staphylinoides*. The weevil *Otiorhynchus ovatus* (BS) is found amongst short vegetation, often where there is bare soil, and may have lived on the eroding ditch bank.

The wider surroundings: land use

Some species may have lived in the immediate vicinity of the ditch but seem as likely to reflect the wider landscape. Species indicating short herbaceous vegetation, including grassland, were conspicuous and included the chafers *Phyllopertha horticola* (3 individuals, and rather abundant in the bulk sample) and *Serica brunnea* (1), the elaterids (click beetles) *Athous haemorrhoidalis* (?2 adults and several larvae, the latter perhaps having lived in soil which eroded into the ditch) and *Agriotes* sp., and *Dascillus cervinus* (1).

Dung beetles were well represented, *Aphodius prodromus* (Brahm) and *A. contaminatus* (Herbst) being rather common (11 and 8 individuals respectively and abundant in the BS), while there were also single individuals of *A. fimetarius*, *A. granarius* and three unidentified species from this genus, and one *Geotrupes* sp. It appears likely that dung was abundant in the landscape, and perhaps very nearby, probably indicating grazing land (the interpretation of land use from suites of dung beetle is discussed by Robinson 1983; 1991). In addition to these scarabaeid dung beetles, which almost certainly bred in dung, various other species may have lived in the droppings of livestock, but may have used other foul matter: *Megasternum obscurum* (5); *Anotylus nitidulus* (5); *Platystethus arenarius* (4); *Onthophilus striatus* (3); and the *Anotylus* species (5 *nitidulus*, 3 each of *?sculpturatus* and *tetracarinatus*, 2 *rugosus*), the *Tachinus* species (3 *marginellus*, 2 each of *corticinus* and *signatus*) and *Cryptopleurum minutum* (1). Overall, species typically associated with foul matter made up about 12% of the assemblage of adult beetles and bugs (Table 5.21 PNRF) and true dung beetles over 10%. There was no evidence of material such as house floor litter, midden accumulations, hay, or stable manure.

Much of the fauna consisted of species favouring human modification of the natural landscape (i.e. 'semi-natural' environments, cf. Kenward and Allison 1994). This impact may have been quite strong, leading to a generally open landscape, as no species associated with trees or shrubs were found in either subsample, despite the presence of branch wood in the sediment (see above). This is regarded as good evidence that the deposit formed during a period when the site saw intensive use. Although tree-associated species may not occur in deposits formed even quite close to woodland (Kenward *et al.*

unpublished), scrub would cover an abandoned site, including the ditch margins, in only a few years and so be detectable in the ditch fill.

Synanthropic species associated with human occupation

The lack of evidence for the kind of decaying matter typical of occupation sites has been remarked upon above. Some beetles often found in artificial accumulations of decomposing matter were present, although in modest numbers, and most may have exploited dung (or for most of these species, litter amongst vegetation or by water). A few, for example *Ptenidium* sp. (2) and *Gyrohypnus* spp. (one each of *angustatus* and *fracticornis*), are perhaps more likely to have come from litter-like material, and this is certainly the case for species such as *Stephostethus lardarius* (2) and *Enicmus* sp. (2). This material was not necessarily the litter of human occupation, as naturally fallen plant debris or piles of vegetation left after cutting would suffice.

Clearly occupation waste was not dumped into this ditch in the way sometimes seen at other sites. It seems likely that there were no structures immediately adjacent (although unpublished calculations by the author and John Carrott, indicate that structures more than a few metres away will not necessarily be visible in ditch fills such as these). The conspicuous absence of species strongly tied to artificial habitats (e.g. grain pests and decomposers associated with stable manure) suggests an isolated settlement (Kenward 1997).

Climatic implications

The most remarkable find in this superb assemblage is of significance beyond archaeology: a specimen of the nettlebug *Heterogaster urticae* (F.) from the small subsample, and remains of three others from the bulk sample. A colony of the bug thus appears to have been established at the site, even though in the mid-20th century it was common in England only in the far south. A single specimen may be a stray migrant, but several cannot be. The possibility of importation from the south in (for example) hay can be ruled out since (a) there is no evidence of disposal of such material in the ditch and (b) the bugs were co-habiting with a range of other typical denizens of nettlebeds. Most of these species (apart from the *Trioza* nymphs) are far more likely to drop off vegetation as it was cut than to remain with it, making importation of the whole community extremely unlikely. It is also hard to imagine bulk plant material having been brought great distances to a site of this kind.

H. urticae is principally associated with stinging nettle, *Urtica dioica* L. During the middle of the 20th century the bug was confined primarily to the south-east of England, with sporadic occurrences in Norfolk and Cheshire, and what seems to have been a stray in Yorkshire (Massee 1955; Southwood and Leston 1959). However, there are numerous fossil records from Roman, Anglo-Scandinavian, and sometimes post-Conquest York, and elsewhere outside the recent range (Hall and Kenward 2000; Kenward and Hall 1995), and the species is regarded as indicating higher temperatures in these periods than in the middle of the 20th century. If it was established in Northumberland, *substantially* higher temperatures are indicated. The Yorkshire records indicate mean July temperatures about 1°C above mid-20th century values (Institute of Terrestrial Ecology 1978; Kenward 2001), but a colony in Northumberland indicates temperatures at least 2°C above mid-20th century values. Probably greater continentality is implied too, for the principal range of *H. urticae* has a south-easterly bias in both England and Scandinavia (Coulianos and Ossiannilsson, 1976; Massee, 1955).

H. urticae appears to have returned to Yorkshire only in the past few years, with records from Eastern Yorkshire (Dolling, in lit) and of colonies near York in 2001 (Kenward, unpublished). It is thus a very convincing indicator of the real effect of the temperature rises associated with the current phase of global warming as well as a promising guide to past climatic change.

Kenward (2001) suggests that records of certain *Platystethus* species may reflect climate change. Three of the species have been recorded from the present site: *P. nitens* (3) and, from the bulk-sieved sample, *P. cornutus* group and *P. nodifrons*. Of these, *P. nodifrons* appears to be the most southerly in its present distribution, reaching to about the Severn-Wash line (Hammond 1971). Some doubt remains as to their significance, however, since Hammond suggests that they may be under-recorded and have had a wider range in the 20th century.

Conclusion

The study of single samples from a site is often unsatisfactory, since there is no way of investigating changes in space and time. However, in the present case a remarkably clear picture of the local environment has been arrived at, and in addition very significant climatic information has been obtained. In summary, the ditch held water, though perhaps not permanently since the range of aquatic insects was limited. There was some vegetation with an aquatic-marginal character in the ditch. Its banks, and probably the immediate surroundings, supported a perennial plant community including nettlebeds and stands of weeds such as docks and plantains. There was pastureland close by and this was probably the predominant land use locally. Nettlebugs, and perhaps some rove beetles, indicate temperatures significantly above those of the middle of the 20th century – perhaps two degrees Celcius or more.

Pollen

by Tony Stevenson

Reasonable preservation with 98% pollen degraded. Assessment of the surviving pollen from the primary ditch silts suggests a local tree cover dominated by *Corylus* (hazel), alder with other tree taxa, some open ground (21% grass total pollen) and some ferns and sedge.

Discussion

by Clive Waddington

The trench over the entrance area of the Flodden Hill enclosure revealed the survival of more structural features than could have been anticipated when it is considered that this field has been deep ploughed subsoiled on a number of occasions and the site lies on a moderately steep slope where soil erosion takes place. The excavation revealed a substantial perimeter ditch and a metalled track leading through the entrance to a well-made cobbled area with an intermittent kerb surviving. The surprising find from this evaluation was the waterlogged basal fill of the perimeter ditch which yielded a wealth of archaeobotanical residues as well as an abundance of datable organic material in a short-lived, sealed context. The radiocarbon dates from the primary ditch fill, together with the monument form, indicate that the site was constructed and occupied in the very late Iron Age or possibly early Romano-British period and was deliberately levelled at a time that potentially corresponds with the early Flavian incursions to the north from *c*.AD 60–70.

The environmental residues from the primary ditch fill have shed important new light on the economy of the site, its landscape setting and climatic reconstruction during the centuries around AD 1. In summary the site was located in a relatively open environment with the base of the enclosure ditch occupied by standing water, on a perennial basis if not permanently, and surrounded by perennial weeds including beds of stinging nettles perhaps on the banks of the ditch. The wider setting of the site included grassland and judging by the quantity of dung beetles this appears to have been abundant in the landscape and is indicative of grazing land for beef livestock. Cultivation is also indicated by the pollen evidence, and barley grains were identified in the basal ditch deposit. It appears to have been a small farmstead at the hub of a mixed farming regime that included arable and pastoral production. Furthermore, the identification of a colony of nettlebugs that live in warmer conditions has led to the estimate for annual temperatures during the occupation of the site being around 2°C above mid-20th century values. Such information is extremely rare for sites of this period in the north (see Huntley and Stallibrass 1995), and these findings shed important new light on our understanding of settlement, land use and climate during the period. It must also be remarked that the high-quality preservation in secure taphonomic contexts took place in what is today a heavily cultivated valley side setting and against archaeological expectations. The importance of the deep cutting of the ditch, the levelled interior scooped into the hillside, and the location of the enclosure on a springline were crucial in this respect. As with the recently excavated palisaded sites at Fawdon Dene in the Breamish valley (Frodsham and Waddington 2004), cropmark sites on the sloping ground of the Cheviot Hills can be spectacularly well preserved, with upstanding remains surviving together with unburnt, burnt and waterlogged organic material, even after intensive ploughing.

No rectilinear enclosures have previously been excavated in the Milfield Basin, and very few on the east side of the Cheviots, so the information recorded from this excavation has considerable regional significance. Most of the rectilinear sites investigated by Jobey (1960; 1973; 1977; 1978) were located in the Tyne Valley or its tributary valleys of the North Tyne and Rede. A rectilinear cropmark settlement in the Breamish valley, South Ingram, under investigation as part of the Breamish Valley Archaeology Project (ASUD 1996), will however, provide important comparisons for the Flodden site as they are monuments of similar type, possibly contemporary, and located in the same river catchment in a similar valley side location.

The substantial nature of the Flodden ditch (at least 2.5m deep) suggests that this enclosure was not simply constructed for stock control as previous commentators have thought (Jobey 1964), but could also have been for practical defensive purposes. The reconstructed drystone wall of a rectilinear settlement, based on the evidence from an excavated site at Woolaw in Upper Redesdale (Charlton and Day 1978), at the Brigantium Archaeological Centre, has shown that high defensive walls can be satisfactorily built on 1.5m wide footings (Fig. 5.42), as revealed by the excavation. This throws open the long-held view that enclosed rectilinear settlements were not intended to have a defensive role. The view advanced here is that rectilinear enclosures may have had a status element attached to them, and were certainly the hub of farming units engaged in livestock and arable production, but in some cases the main reason for their enclosure by substantial palisades, banks, ditches and walls was probably to create defended farmsteads. Many of these sites are positioned along Roman supply routes as can be seen by their clustering around Roman roads, and some are clearly Romano-British being of 1st to 2nd century AD date, although in a few cases some show evidence for earlier pre-Roman Iron Age origins.

The location of similar settlements in the Milfield Basin suggests there is a patterning to their position, with many located at a similar altitude on south and

Table 5.19. Complete list of invertebrate remains recorded from Flodden Hill in taxonomic order (continued opposite).

*Order and nomenclature follow Kloet and Hincks (1964–77) for insects. Where both secure and tentative identifications for a given taxon were recorded, only the former are listed here. Key: * = not used in calculating assemblage statistics (Table 5.21); (BS) - recorded only from the bulk-sieved sample; ecode ecological code used in generating main statistics; Sp(p).species not previously listed; Sp(p). indet.may be a species already listed.*

Taxon	ecode
Annelida	
*Oligochaeta sp. (egg capsule)	u
Crustacea	
**Daphnia* sp. (ephippium)	oa-w
*Cladocera spp. (ephippium)	oa-w
*Ostracoda sp.	u
Insecta	
Dermaptera	
*Dermaptera sp.	u
Hemiptera	
Heterogaster urticae (Fabricius)	oa-p
Stygnocoris pedestris (Fallen)	oa
Drymus sylvaticus (Fabricius)	oa-p
Scolopostethus ?affinis (Schilling)	oa-p
Anthocoris sp. (BS)	oa-p
Gerris sp.	oa-w
Corixidae spp.	oa-w
Philaenus spumarius (Linnaeus)	oa-p
Megophthalmus ?scanicus (Fallen)	oa-p
Aphrodes flavostriatus (Donovan)	oa-p-d
Aphrodes spp.	oa-p
Cicadellidae spp.	oa-p
Delphacidae sp.	oa-p
*Auchenorhyncha sp. (nymph)	oa-p
Trioza urticae (Linnaeus)	oa-p
**Trioza urticae* (nymph)	oa-p
*Aphidoidea sp.	u
Lepidoptera	
*Lepidoptera sp. (pupa)	u
Diptera	
*Chironomidae sp. (larva)	w
*Bibionidae sp.	u
*Dolichopodidae sp.	u
*Diptera sp. (adult)	u
*Diptera sp. (puparium)	u
Coleoptera	
Loricera pilicornis (Fabricius)	oa
Dyschirius globosus (Herbst) (BS)	oa
Clivina fossor (Linnaeus)	oa
Trechus quadristriatus (Schrank) (BS)	oa
Trechus obtusus or *quadristriatus*	oa
Trechus rubens (Fabricius) (BS)	u
Trechus secalis (Paykull) (BS)	oa-d
Bembidion lampros (Herbst) (BS)	oa
Pterostichus cupreus (Linnaeus) (BS)	oa
Pterostichus nigrita (Paykull)	oa-d
Pterostichus strenuus (Panzer)	oa
Calathus fuscipes (Goeze)	oa
Calathus melanocephalus (Linnaeus)	oa
Amara ?lucida (Duftschmid)	oa
Amara sp.	oa
Harpalus rufipes (Degeer) (BS)	oa
Harpalus rufibarbis (Fabricius)	oa
Badister sp. (BS)	oa
Haliplus sp.	oa-w
Hydroporus spp.	oa-w
Agabus bipustulatus (Linnaeus)	oa-w
Agabus sp.	oa-w
Colymbetes fuscus (Linnaeus) (BS)	oa-w
Dytiscus sp. (BS)	oa-w
Gyrinus sp.	oa-w
Helophorus aquaticus (Linnaeus)	oa-w
Helophorus grandis Illiger	oa-w
Helophorus spp.	oa-w
Sphaeridium sp. (BS)	rf
Cercyon analis (Paykull)	rt-sf
Cercyon ?haemorrhoidalis (Fabricius) (BS)	rf-sf
Cercyon tristis (Illiger)	oa-d
Cercyon ustulatus (Preyssler) (BS)	oa-d
Megasternum obscurum (Marsham)	rt
Cryptopleurum minutum (Fabricius)	rf-st
Hydrobius fuscipes (Linnaeus)	oa-w
Acritus nigricornis (Hoffmann) (BS)	rt-st
Onthophilus striatus (Forster)	rt-sf
Histerinae sp.	rt
Ochthebius ?minimus (Fabricius)	oa-w
Hydraena sp. (BS)	oa-w
Limnebius truncatellus (Thunberg)	oa-w
Ptenidium sp.	rt
Acrotrichis sp. (BS)	rt
Ptiliidae sp.	u
Choleva sp.	u
Catops sp. (BS)	u
Aclypea opaca (Linnaeus) (BS)	ob-rt
Silpha sp. (BS)	u
Micropeplus porcatus (Paykull) (BS)	rt
Micropeplus staphylinoides (Marsham)	rt
Megarthrus denticollis (Beck) (BS)	rt-sf
Megarthrus sp. indet.	rt
Olophrum piceum (Gyllenhal) (BS)	oa
Lesteva longoelytrata (Goeze)	oa-d
Omalium ?caesum (Gravenhorst)	rt-sf
Omalium ?italicum (Bernhauer)	rt-sf
Coryphium angusticolle (Stephens) (BS)	u
Carpelimus bilineatus (Stephens)	rt-sf
Platystethus arenarius (Fourcroy)	rf
Platystethus cornutus group (BS)	oa-d
Platystethus nitens (Sahlberg)	oa-d
Platystethus nodifrons (Mannerheim) (BS)	oa-d
Anotylus nitidulus (Gravenhorst)	rt
Anotylus rugosus (Fabricius)	rt
Anotylus ?sculpturatus group	rt
Anotylus tetracarinatus (Block)	rt
Stenus spp.	u
Lathrobium sp. (BS)	u
Rugilus orbiculatus (Paykull) (BS)	rt-sf
Othius sp.	rt

Leptacinus ?pusillus (Stephens)	rt-st
Gyrohypnus angustatus (Stephens)	rt-st
Gyrohypnus fracticornis (Muller)	rt-st
Xantholinus linearis (Olivier)	rt-sf
Philonthus spp.	u
Staphylinus sp.	u
Staphylininae sp. indet.	u
Tachyporus spp.	u
Tachinus corticinus (Gravenhorst)	u
Tachinus marginellus (Fabricius)	u
Tachinus signatus (Gravenhorst)	u
Cordalia obscura (Gravenhorst)	rt-sf
Falagria sp. (BS)	rt-sf
Drusilla canaliculata (Fabricius) (BS)	u
Aleochara sp.	u
Aleocharinae spp.	u
Pselaphidae sp.	u
Geotrupes sp?p.	oa-rf
Aphodius contaminatus (Herbst)	oa-rf
Aphodius fimetarius (Linnaeus)	oa-rf
Aphodius granarius (Linnaeus)	ob-rf
Aphodius prodromus (Brahm)	ob-rf
Aphodius spp.	ob-rf
Serica brunnea (Linnaeus)	oa-p
Phyllopertha horticola (Linnaeus)	oa-p
Dascillus cervinus (Linnaeus)	oa-p
Cytilus sericeus (Forster) (BS)	oa-p
Esolus parallelepipedus (Muller)	oa-w
Oulimnius sp.	oa-w
Athous ?haemorrhoidalis (Fabricius)	oa-p
**Athous haemorrhoidalis* (larva)	oa-p
Agriotes sp.	oa-p
Cantharis spp.	ob
Ptinus sp.	rd-sf
Brachypterus glaber (Stephens)	oa-p
Meligethes sp.	oa-p
Monotoma longicollis (Gyllenhall) (BS)	rt-st
Cryptophagus sp.	rd-sf
Atomaria spp.	rd
Rhyzobius litura (Fabricius)	oa-p
Stephostethus lardarius (Degeer)	rt-st
Enicmus sp.	rt-sf
Corticaria sp.	rt-sf
Corticarina ?fuscula (Gyllenhal)	rt
Cortinicara gibbosa (Herbst)	rt
Donaciinae sp.	oa-d-p
Chrysolina staphylaea (Linnaeus)	oa-p
Gastrophysa viridula (Degeer)	oa-p
Phaedon tumidulus (Germar)	oa-p
Phyllotreta nemorum group	oa-p
Crepidodera ferruginea (Scopoli)	oa-p
Chaetocnema concinna (Marsham)	oa-p
Chaetocnema sp.	oa-p
Psylliodes sp. (BS)	oa-p
Cassida sp. (BS)	oa-p
Apion spp.	oa-p
Otiorhynchus ovatus (Linnaeus) (BS)	oa-p
Phyllobius or *Polydrusus* sp. (BS)	oa-p
Sitona lepidus (BS) (Gyllenhal)	oa-p
Sitona sp. (BS)	oa-p
Hypera sp.	oa-p
Alophus triguttatus (Fabricius) (BS)	oa-p
Tanysphyrus lemnae (Paykull) (BS)	oa-w-p
Notaris acridulus (Linnaeus) (BS)	oa-d-p
Micrelus ericae (Gyllenhal) (BS)	oa-p-m
Cidnorhinus quadrimaculatus (Linnaeus)	oa-p
Ceutorhynchus contractus (Marsham) (BS)	oa-p
Ceutorhynchus spp.	oa-p
Rhinoncus pericarpius (Linnaeus) (BS)	oa-p
Mecinus pyraster (Herbst) (BS)	oa-p
Gymnetron labile (Herbst)	oa-p
Curculionidae spp.	oa
Coleoptera spp.	u
*Coleoptera sp. (larva)	u
Hymenoptera	
*Chalcidoidea sp.	u
*Hymenoptera Parasitica sp.	u
**Myrmica* sp. (BS)	u
*Formicidae sp.	u
*Insecta sp. (immature)	u
Arachnida	
*Aranae sp.	u
*Acarina sp.	u

east facing slopes, close to springs or watercourses, and at regular intervals across the richest areas of farmland. The regular and planned layout of the enclosure, together with the positioning of the other rectilinear enclosures elsewhere in the basin, is indicative of prior planning of settlement both on the site and valley-wide scale. The sites in the basin are all within view of the Roman road that is thought to have passed through this valley and those on the dipslope of the sandstone escarpment to the east of Doddington Moor were located within a few hundred metres of the other major Roman Road, the Devil's Causeway.

This positioning replicates the situation in Redesdale where the many rectilinear settlements are located on hillsides close to springs or watercourses and within sight of Dere Street, along which they are strung out. Most of these settlements are also located on south and east facing slopes in order to enjoy the best aspect and many, Woolaw for example, are in view of the Roman outpost fort of Bremenium (High Rochester). The Flodden site, then, could have formed a component in a planned settlement pattern that was created as part of a coherent policy and abandoned after what appears to have been a brief period of occupation at the time of the early Roman incursions into the north.

The length of time settlements were occupied may or may not differ between Redesdale and the Till valley and variation could be associated with their location in different tribal territories which may

Table 5.20. Insects and other macro-invertebrates from Flodden Hill: species list for the 2 kg subsample (continued opposite).

Taxa are listed in descending order of abundance except those marked '', which were not used in calculation of statistics in Table 5.21, and are listed together at the end. Key: n - minimum number of individuals; q - quantification (s - semi-quantitative >several=, m - semi-quantitative >many=, both sensu Kenward et al. (1986), e - estimate); ec - ecological codes (see Table 5.22 for explanation); ReM - recording method (N - non-quantitative; D - detailed, sensu Kenward 1992)*

Context: 5 Sample: 0/BS ReM: N

Notes: Entered HK 29/8/01. Paraffined BS material, re-wetted and boiled. Scanned for additional taxa and to estimate abundance of rarer ones seen in /1. Usually, new taxa only have been listed here. **1 = present.**

Taxon	**n**	**q**	**ec**
Heterogaster urticae	3	-	oa-p
Anthocoris sp.	1	-	oa-p
Dyschirius globosus	1	-	oa
Clivina fossor	1	-	oa
Trechus quadristriatus	1	-	oa
Trechus rubens	1	-	u
Trechus secalis	1	-	oa-d
Bembidion lampros	1	-	oa
Pterostichus cupreus	1	-	oa
Calathus melanocephalus	1	-	oa
Harpalus rufipes	1	-	oa
Badister sp.	1	-	oa
Colymbetes fuscus	1	-	oa-w
Dytiscus sp.	1	-	oa-w
Sphaeridium sp.	1	-	rf
Cercyon ?haemorrhoidalis	1	-	rf-sf
Cercyon ustulatus	1	-	oa-d
Histerinae sp.	1	-	rt
Hydraena sp.	1	-	oa-w
Acrotrichis sp.	1	-	rt
Catops sp.	1	-	u
Aclypea opaca	1	-	ob-rt
Silpha sp.	1	-	u
Micropeplus porcatus	1	-	rt
Megarthrus denticollis	1	-	rt-sf
Olophrum piceum	1	-	oa
Coryphium angusticolle	1	-	u
Platystethus cornutus group	1	-	oa-d
Platystethus nodifrons	1	-	oa-d
Lathrobium sp.	1	-	u
Rugilus orbiculatus	1	-	rt-sf
Cordalia obscura	1	-	rt-sf
Falagria sp.	1	-	rt-sf
Drusilla canaliculata	1	-	u
Geotrupes sp.	1	-	oa-rf
Aphodius fimetarius	1	-	oa-rf
Cytilus sericeus	1	-	oa-p
Monotoma longicollis	1	-	rt-st
Psylliodes sp.	1	-	oa-p
Cassida sp.	1	-	oa-p
Otiorhynchus ovatus	1	-	oa-p
Phyllobius or Polydrusus sp.	1	-	oa-p
Sitona lepidus	1	-	oa-p
Sitona sp.	1	-	oa-p
Alophus triguttatus	1	-	oa-p
Tanysphyrus lemnae	1	-	oa-w-p
Notaris acridulus	1	-	oa-d-p
Micrelus ericae	1	-	oa-p-m
Ceutorhynchus contractus	1	-	oa-p
Rhinoncus pericarpius	1	-	oa-p
Mecinus pyraster	1	-	oa-p
Acritus nigricornis	1	-	rt-st
Coleoptera sp. A	1	-	u
*Formicidae sp.	1	-	u
*Myrmica sp.	1	-	u

Context: 5 Sample: 12/1 ReM: D

Weight: 2.00 E: 2.00 F: 2.00

Notes: Entered HK 19/7/01. Mostly recorded on filter paper. E 1.5-3.0, mode 2.0, very strong; F 1.5-3.0, mode 2.0, distinct. No colour change seen. Many fossils distorted, but not as seen in bird droppings: perhaps caused by pressure on sediment, even cattle trampling?

Taxon	**n**	**q**	**ec**
Brachypterus glaber	13	-	oa-p
Aphodius contaminatus	11	-	oa-rf
Helophorus sp. D	8	-	oa-w
Aphodius prodromus	8	-	ob-rf
Aleocharinae sp. E	6	-	u
Scolopostethus ?affinis	5	-	oa-p
Megasternum obscurum	5	-	rt
Anotylus nitidulus	5	-	rt
Platystethus arenarius	4	-	rf
Cordalia obscura	4	-	rt-sf
Ceutorhynchus sp. C	4	-	oa-p
Philaenus spumarius	3	-	oa-p
Megophthalmus ?scanicus	3	-	oa-p
Aphrodes sp. A	3	-	oa-p
Haliplus sp.	3	-	oa-w
Helophorus aquaticus	3	-	oa-w
Onthophilus striatus	3	-	rt-sf
Limnebius truncatellus	3	-	oa-w
Micropeplus staphylinoides	3	-	rt
Platystethus nitens	3	-	oa-d
Anotylus ?sculpturatus group	3	-	rt
Anotylus tetracarinatus	3	-	rt
Xantholinus linearis	3	-	rt-sf
Tachinus marginellus	3	-	u
Phyllopertha horticola	3	-	oa-p
Gastrophysa viridula	3	-	oa-p
Cidnorhinus quadrimaculatus	3	-	oa-p
Corixidae sp. A	2	-	oa-w
Aphrodes flavostriatus	2	-	oa-p-d
Aphrodes sp. B	2	-	oa-p
Trioza urticae	2	-	oa-p
Pterostichus nigrita	2	-	oa-d
Helophorus sp. A	2	-	oa-w
Cercyon tristis	2	-	oa-d
Hydrobius fuscipes	2	-	oa-w
Ochthebius ?minimus	2	-	oa-w
Ptenidium sp.	2	-	rt
Lesteva longoelytrata	2	-	oa-d

Omalium ?caesum	2	-	rt-sf	Aleocharinae sp. B	1	-	u
Carpelimus bilineatus	2	-	rt-sf	Aleocharinae sp. C	1	-	u
Anotylus rugosus	2	-	rt	Pselaphidae sp.	1	-	u
Philonthus sp. A	2	-	u	Geotrupes sp.	1	-	oa-rf
Tachinus corticinus	2	-	u	Aphodius fimetarius	1	-	oa-rf
Tachinus signatus	2	-	u	Aphodius granarius	1	-	ob-rf
Aleocharinae sp. D	2	-	u	Aphodius sp. A	1	-	ob-rf
Esolus parallelepipedus	2	-	oa-w	Aphodius sp. B	1	-	ob-rf
Athous ?haemorrhoidalis	2	-	oa-p	Aphodius sp. C	1	-	ob-rf
Meligethes sp.	2	-	oa-p	Serica brunnea	1	-	oa-p
Stephostethus lardarius	2	-	rt-st	Dascillus cervinus	1	-	oa-p
Enicmus sp.	2	-	rt-sf	Oulimnius sp.	1	-	oa-w
Phaedon tumidulus	2	-	oa-p	Agriotes sp.	1	-	oa-p
Ceutorhynchus sp. B	2	-	oa-p	Cantharis sp. A	1	-	ob
Heterogaster urticae	1	-	oa-p	Cantharis sp. B	1	-	ob
Stygnocoris pedestris	1	-	oa	Ptinus sp.	1	-	rd-sf
Drymus sylvaticus	1	-	oa-p	Cryptophagus sp.	1	-	rd-sf
Gerris sp.	1	-	oa-w	Atomaria sp. A	1	-	rd
Corixidae sp. B	1	-	oa-w	Atomaria sp. B	1	-	rd
Cicadellidae sp. A	1	-	oa-p	Rhyzobius litura	1	-	oa-p
Cicadellidae sp. B	1	-	oa-p	Corticaria sp.	1	-	rt-sf
Delphacidae sp.	1	-	oa-p	Corticarina ?fuscula	1	-	rt
Loricera pilicornis	1	-	oa	Cortinicara gibbosa	1	-	rt
Clivina fossor	1	-	oa	Donaciinae sp.	1	-	oa-d-p
Trechus obtusus or quadristriatus	1	-	oa	Chrysolina staphylaea	1	-	oa-p
Pterostichus strenuus	1	-	oa	Phyllotreta nemorum group	1	-	oa-p
Calathus fuscipes	1	-	oa	Crepidodera ferruginea	1	-	oa-p
Calathus ?melanocephalus	1	-	oa	Chaetocnema concinna	1	-	oa-p
Amara ?lucida	1	-	oa	Chaetocnema sp.	1	-	oa-p
Amara sp.	1	-	oa	Apion sp. A	1	-	oa-p
Harpalus rufibarbis	1	-	oa	Apion sp. B	1	-	oa-p
Hydroporus sp. A	1	-	oa-w	Apion sp. C	1	-	oa-p
Hydroporus sp. B	1	-	oa-w	Hypera sp.	1	-	oa-p
Agabus bipustulatus	1	-	oa-w	Ceutorhynchus sp. A	1	-	oa-p
Agabus sp.	1	-	oa-w	Gymnetron labile	1	-	oa-p
Gyrinus sp.	1	-	oa-w	Curculionidae sp. A	1	-	oa
Helophorus grandis	1	-	oa-w	Curculionidae sp. B	1	-	oa
Helophorus sp. B	1	-	oa-w	Coleoptera sp.	1	-	u
Helophorus sp. C	1	-	oa-w	*Daphnia sp. (ephippium)	500	e	oa-w
Helophorus sp. E	1	-	oa-w	*Cladocera sp. L (ephippium)	100	e	oa-w
Cercyon analis	1	-	rt-sf	*Acarina sp.	50	e	u
Cryptopleurum minutum	1	-	rf-st	*Ostracoda sp.	15	m	u
Histerinae sp.	1	-	rt	*Trioza urticae (nymph)	15	m	oa-p
Ptiliidae sp.	1	-	u	*Insecta sp. (immature)	15	m	u
Choleva sp.	1	-	u	*Diptera sp. (adult)	6	s	u
Megarthrus sp.	1	-	rt	*Bibionidae sp.	6	s	u
Omalium ?italicum	1	-	rt-sf	*Chironomidae sp. (larva)	6	s	w
Stenus sp. A	1	-	u	*Athous haemorrhoidalis (larva)	6	-	oa-p
Stenus sp. B	1	-	u	*Coleoptera sp. (larva)	6	s	u
Othius sp.	1	-	rt	*Aphidoidea sp.	4	-	u
Leptacinus ?pusillus	1	-	rt-st	*Auchenorhyncha sp. (nymph)	3	-	oa-p
Gyrohypnus angustatus	1	-	rt-st	*Hymenoptera Parasitica sp.	3	-	u
Gyrohypnus fracticornis	1	-	rt-st	*Cladocera sp. F (ephippium)	2	-	oa-w
Philonthus sp. B	1	-	u	*Dermaptera sp.	1	-	u
Philonthus sp. C	1	-	u	*Oligochaeta sp. (egg capsule)	1	-	u
Philonthus sp. D	1	-	u	*Cladocera sp. (ephippium)	1	-	oa-w
Staphylinus sp.	1	-	u	*Lepidoptera sp. (pupa)	1	-	u
Staphylininae sp.	1	-	u	*Diptera sp. (puparium)	1	-	u
Tachyporus sp. A	1	-	u	*Dolichopodidae sp.	1	-	u
Tachyporus sp. B	1	-	u	*Chalcidoidea sp.	1	-	u
Aleochara sp.	1	-	u	*Formicidae sp.	1	-	u
Aleocharinae sp. A	1	-	u	*Aranae sp.	1	-	u

Table 5.21. Main statistics (given to nearest whole number) for the assemblage of adult Coleoptera and Hemiptera, excluding Aphidoidea and Coccidoidea, from the 2 kg subsample from Flodden Hill.

For explanation of codes see Table 5.22.

Context	**5**
Sample	**12**
Ext	**/1**
S	138
N	257
ALPHA	121
SEALPHA	13
SOB	84
PSOB	61
NOB	162
PNOB	63
ALPHAOB	70
SEALPHAOB	9
SW	21
PSW	15
NW	39
PNW	15
ALPHAW	19
SEALPHAW	5
SD	6
PSD	4
ND	12
PND	5
ALPHAD	0
SEALPHAD	0
SP	37
PSP	27
NP	75
PNP	29
ALPHAP	29
SEALPHAP	6
SM	0
PSM	0
NM	0
PNM	0
ALPHAM	0
SEALPHAM	0
SL	0
PSL	0
NL	0
PNL	0
ALPHAL	0
SEALPHAL	0
SRT	39
PSRT	28
NRT	86
PNRT	33
ALPHART	28
SEALPHART	5
SRD	4
PSRD	3
NRD	4
PNRD	2
ALPHARD	0
SEALPHARD	0
SRF	10
PSRF	7
NRF	30
PNRF	12
ALPHARF	5
SEALPHARF	2
SSA	16
PSSA	12
NSA	27
PNSA	11
ALPHASA	17
SEALPHASA	6
SSF	11
PSSF	8
NSF	21
PNSF	8
ALPHASF	10
SEALPHASF	4
SST	5
PSST	4
NST	6
PNST	2
ALPHAST	0
SEALPHAST	0
SSS	0
PSSS	0
NSS	0
PNSS	0
ALPHASS	0
SEALPHASS	0
SG	0
PSG	0
NG	0
PNG	0
ALPHAG	0
SEALPHAG	0
ALPHAG	0
SEALPHAG	0

Table 5.22. Abbreviations for ecological codes and statistics used for interpretation of insect remains in text and tables.

Lower case codes in parentheses are those assigned to taxa and used to calculate the group values (the codes in capitals). See Table 5.19 for codes assigned to taxa from the Flodden Hill site. Alpha – the index of diversity alpha (Fisher et al. 1943); Indivs – individuals (based on MNI); No – number.

No taxa	S	Percentage of indivs of grain pests	PNG
Estimated number of indivs (MNI)	N	No decomposer taxa (rt + rd + rf)	SRT
Index of diversity (◎)	alpha	Percentage of RT taxa	PSRT
Standard error of alpha	SE alpha	No RT indivs	NRT
No >certain= outdoor taxa (oa)	SOA	Percentage of RT indivs	PNRT
Percentage of >certain= outdoor taxa	PSOA	Index of diversity of RT component	alpha RT
No >certain= outdoor indivs	NOA	Standard error	SEalphaRT
Percentage of >certain= outdoor indivs	PNOA	No >dry= decomposer taxa (rd)	SRD
No OA and probable outdoor taxa (oa+ob)	SOB	Percentage of RD taxa	PSRD
Percentage of OB taxa	PSOB	No RD indivs	NRD
No OB indivs	NOB	Percentage of RD indivs	PNRD
Percentage OB indivs	PNOB	Index of diversity of the RD component	alphaRD
Index of diversity of the OB component	alphaOB	Standard error	SEalphaRD
Standard error	SEalphaOB	No >foul= decomposer taxa (rf)	SRF
No aquatic taxa (w)	SW	Percentage of RF taxa	PSRF
Percentage of aquatic taxa	PSW	No RF indivs	NRF
No aquatic indivs	NW	Percentage of RF indivs	PNRF
Percentage of W indivs	PNW	Index of diversity of the RF component	alphaRF
Index of diversity of the W component	alphaW	Standard error	SEalphaRF
Standard error	SEalphaW	No synanthropic taxa (sf+st+ss)	SSA
No damp ground/waterside taxa (d)	SD	Percentage of synanthropic taxa	PSSA
Percentage D taxa	PSD	No synanthropic indivs	NSA
No damp D indivs	ND	Percentage of SA indivs	PNSA
Percentage of D indivs	PND	Index of diversity of SA component	ALPHASA
Index of diversity of the D component	alphaD	Standard error	SEALPHASA
Standard error	SEalphaD	No facultatively synanthropic taxa (sf)	SSF
No strongly plant-associated taxa (p)	SP	Percentage of SF taxa	PSSF
Percentage of P taxa	PSP	No SF indivs	NSF
No strongly P indivs	NP	Percentage of SF indivs	PNSF
Percentage of P indivs	PNP	Index of diversity of SF component	ALPHASF
Index of diversity of the P component	alphaP	Standard error	SEALPHASF
Standard error	SEalphaP	No typical synanthropic taxa (st)	SST
No heathland/moorland taxa (m)	SM	Percentage of ST taxa	PSST
Percentage of M taxa	PSM	No ST indivs	NST
No M indivs	NM	Percentage of ST indivs	PNST
Percentage of M indivs	PNM	Index of diversity of ST component	ALPHAST
Index of diversity of the M component	alphaM	Standard error	SEALPHAST
Standard error	SEalphaM	No strongly synanthropic taxa (ss)	SSS
No wood-associated taxa (l)	SL	Percentage of SS taxa	PSSS
Percentage of L taxa	PSL	No SS indivs	NSS
No L indivs	NL	Percentage of SS indivs	PNSS
Percentage of L indivs	PNL	Index of diversity of SS component	ALPHASS
Index of diversity of the L component	alphaL	Standard error	SEALPHASS
Standard error	SEalphaL	No uncoded taxa (u)	SU
No indivs of grain pests (g)	NG	Percentage of uncoded indivs	PNU

have had different relationships with Rome. On abandonment the Flodden site was deliberately levelled, leaving very little surface trace of its existence. The enclosure bank that must have existed, and that may have had a stone revetment, appears to have been deliberately levelled and pushed into the ditch. If these are shortlived planned settlements with defensive capabilities, that were deliberately levelled when abandoned, it raises important questions as to the nature of the relationship between Rome and the

Fig. 5.42. The experimental reconstruction of dry-stone walls at Brigantium, reaching at least 2.5m in height with space for a heavy timber breastwork set in clay, based on the width of the wall bases observed during the excavations at the nearby site at Woolaw.

Votadini, the extent to which this relationship changed over time and the impact of the *pax Romana* on the Votadinian population. The imposition of these new settlements on to the landscape must have impacted on the existing settlement organisation. Similarly, the settlement pattern that emerged after the abandonment of many of the rectilinear sites needs to be addressed. Was the old system reinstated or were aspects of each combined in a new system of settlement and land use?

Consideration of the results from this evaluation may help to shape further research questions and direct the trajectory of future fieldwork. Given the recent advances in radiocarbon dating and the precision now available through the application of Bayesian modeling and careful sample selection, there is now the potential to tie down the dating of this monument class still further, and this could provide the key to unlocking their chronologies and thus their wider significance with regard to Late Iron Age settlement organisation and the impact of the Roman empire.

At present it may be speculated that the site was levelled by Roman decree, or that shortly after the Roman withdrawal from the Tyne-Forth region the Votadini levelled the planned rectilinear settlements to the point that they were no longer visible in the landscape. The question as to why some of these settlements were levelled, but not others, raises many interesting issues. Perhaps these small defended farming settlements, which could only have accommodated an extended family at most, were imposed as part of an imperial policy to increase and control agricultural production along the main supply routes leading north. Being in view of the Roman roads, they could be easily monitored by patrolling troops and thus the line of supply more easily safeguarded. If the enclosures were defended, as appears to be the case at Flodden, bearing in mind the scale of the ditch and sorted stone in the upper fill, these defences may have been sufficient to hold off small-scale raids or thieving of the stock/grain tribute until the arrival of Roman military support. How the Votadini viewed these settlements remains a fascinating question but judging by the short life of the Flodden site it would appear that they were an interruption to the existing settlement system, perhaps imposed on the local populace and not looked on favourably. It is perhaps pertinent to consider that most of the upstanding rectilinear settlements are located on the south and west side of the Cheviot massif along the line of Dere Street where outpost forts north of Hadrian's Wall remained occupied (e.g. Habitancum and Bremenium) and in land thought to belong to the 'Textoverdi' who may have been part of the Brigantian confederacy. In contrast, most of the rectilinear sites to the north and east of the Cheviot massif are levelled, and this includes sites in lowland settings as well as those in upland settings, where they should survive if they were anything like their counterparts in North Tynedale and Redesdale. This land, however, is regarded as lying within the territory of the Votadini. Perhaps the different political arrangements between these different tribal areas and the Roman Empire may explain the differential survival of rectilinear settlements on either side of the Cheviots?

REDSCAR WOOD PIT ALIGNMENT

Introduction

The Redscar Wood pit alignment (SMR number NT93SW41) survives as a buried site with no surface remains visible above ground. It is visible on aerial photographs as a cropmark (Fig. 5.43) and was noted by Miket during his work on the Ewart 1 alignment, referred to on this occasion as the 'Milfield Plantation' site (Miket 1981, 137) and later as the Redscar Wood site (Miket 1987, 75–76). It is centred at NT94703430 in a flat ploughed field on a raised fluvio-glacial sand and gravel terrace. Two pit alignments at approximate right angles link together in this field (Fig. 5.44). The shorter east to west alignment was selected for investigation. The pit alignment is situated on level ground in the centre of the basin at 41m OD on an area of free-draining land surrounded by lower and wetter ground on all sides. This ground formed one of the alluvial gravel 'islands' identified in the geomorphological and fieldwalking study. Kimmerston Bog encloses this dry ground on its north and east sides while the floodplain of the River Till encloses it on its south and west sides. The area occupied by the alignment has wide views to the encircling horizons of the basin, although the river is not directly visible from this terrace. The soils covering the site consist of typical brown podzolic soils (Payton 1980) and are free draining and stony.

The pit alignments are fairly straight with the northwest-southeast alignment extending for *c*.900m from the south-east edge of the gravel 'island' to its junction with the northeast to southwest alignment. This second alignment can be observed for *c*.300m before it runs into Bog Plantation and it is not visible on aerial photographs of Kimmerston Bog on the other side of the plantation. It appears, therefore, that this alignment also terminates at the edge of the 'island' where it merges into bogland. Therefore, it appears that the pit alignments respect the edges of this raised dry ground and, together with the surrounding marshy ground, link up to partition this discrete piece of land. Along the course of the

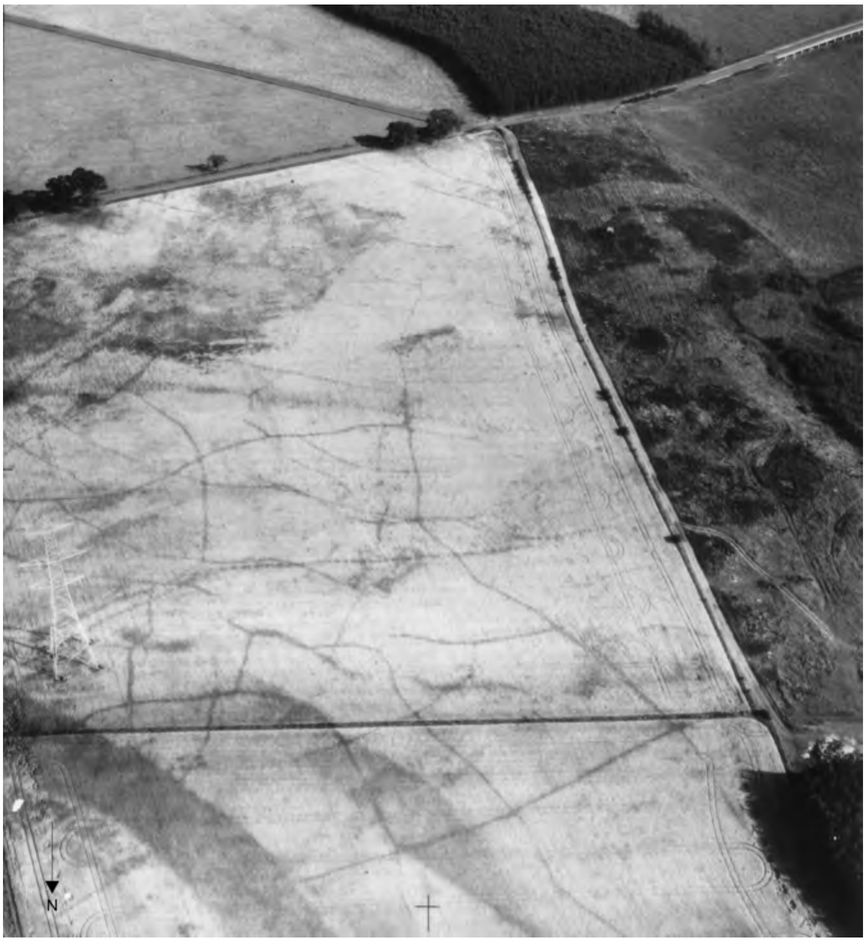


Fig. 5.43. Aerial photograph showing the Redscar Wood pit alignment together with patterned ground of glacial origin.

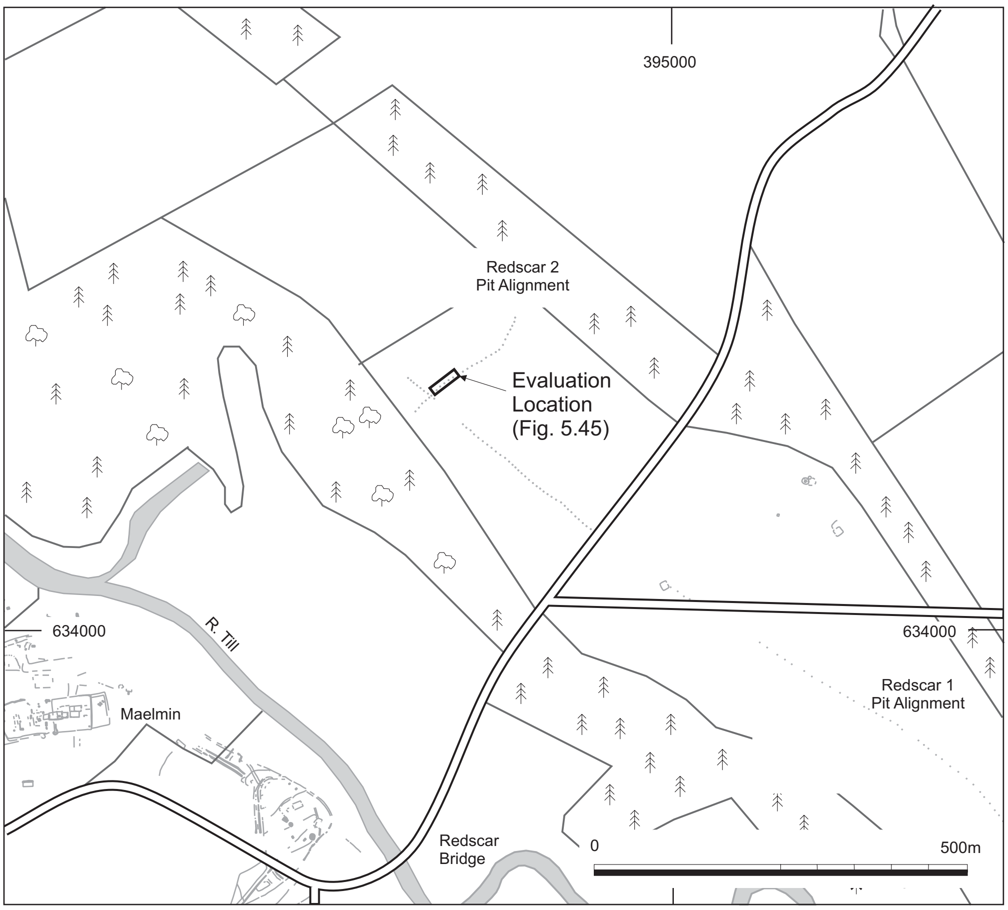


Fig. 5.44. Redscar Wood pit alignment location plan.

longer of the two alignments a number of gaps can be observed which appear to be access places through this boundary feature. Also, what appears to be a linear ditch can be observed running up to this alignment at right angles and this feature may also form part of this system of land allottment. The layout of these alignments, with a right angled turn and entrances across them, recalls in particular the Ewart complex of pit alignments where three-sides of a rectangle can be observed with a small henge monument and possible mortuary enclosure contained within it (Miket 1981; Waddington 1997, 28). Canon Greenwell recorded the discovery of a pottery sherd beneath a stone in Redscar Wood (Greenwell 1868), together with fragments of two further vessels found a metre away but later lost (Miket 1976, 118; Longworth 1969). The surviving Redscar sherd is a piece of Grooved Ware in the Clacton sub-style and it can be reasonably assumed that these finds are indicative of Late Neolithic/Early Bronze Age cemeteries within this area.

Excavation

A trench measuring 19m by 3.5m was laid out over a section of the shorter pit alignment towards its west end, close to the intersection with the longer north-east to south-west alignment. The topsoil, which had a stubble cover, was removed by machine and the remaining contexts cleaned and excavated by hand. The topsoil has been systematically ploughed over many years with winter wheat the usual crop, though in recent years carrots and potatoes have also been grown. All archaeological remains within the topsoil horizon have been obliterated by the plough, leaving only truncated deposits below. After removal of the topsoil (context 1), a series of features was exposed in the trench cut into the natural sand and gravel substratum below. The trench contained a linear row of seven ovoid pits which could be observed running along the trench from east to west, although they did not form a perfectly straight line (see Fig 5.48). Five of the pits were excavated. A small post hole (context 15) was located towards the east end of the trench near to the unexcavated pit (context 2).

Features

The Pits

For full individual feature descriptions see the summary table below (Table 5.23). With the exception of pit 4 all the pits had single homogeneous fills with no evidence of weathering or gradual siltation of the pit. The fills all consisted of the redeposited topsoil together with sand and gravel upcast. This implies that the pits were backfilled shortly after they were dug and that they had not been left open for any length of time. Three of the pits contained evidence suggesting they may have held timber uprights in the form of post sockets, while such evidence could not be detected in pits 8 and 6. Pit 6 had been heavily disturbed by rabbit burrowing and this probably accounts for why there was no evidence left of the pit having contained a timber. The pits generally have a u-shaped profile across their short axes and an elongated u-shaped profile along their long axes (Fig. 5.45), although in one case one end had been cut deeper than the other (pit 10). In another there were depressions at each end (pit 12), suggesting that the pit could have either held two posts or that one had replaced the other. The pits that may have held a post tended to have the 'post' socket located towards the east end of the pit. Although no obvious post-pipes could be observed it was the existence of sockets in the base of the pits that suggested the existence of posts. The pits were not set in a direct straight line, but rather in a slightly sinuous alignment. The pits were situated on average 3.2m apart from pit centre to pit centre (Fig. 5.45).

The deeper areas noted in pits 8 and 12, which were considered to be the areas where the posts could have been set, measured 0.3m in diameter, tapering to 0.1m, indicating the possible size of the timbers. Pit 4 had a deeper area at its west end that appeared to have held the original post, but at the east end of the pit a squared socket cut into a shelf in the side of the pit suggested a squared timber measuring 0.27m thick had been placed. This was the only pit to have an upper and a lower fill and it appeared that the pit had been recut for the insertion of the later squared timber as this socket only extended down to the base of the upper fill, whereas the deeper western socket

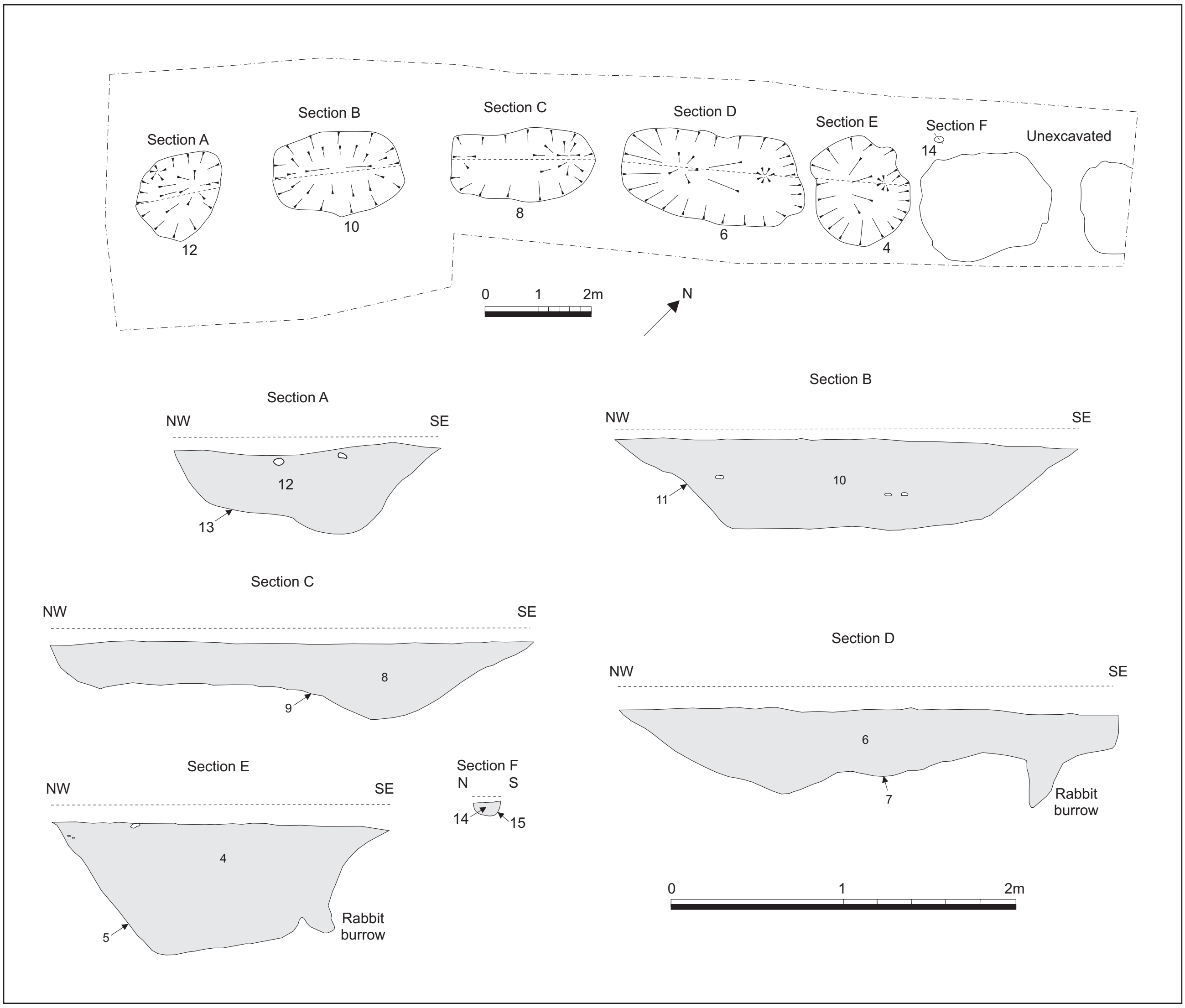


Fig. 5.45. Redscar Wood pit alignment trench plan and section drawings.

had been cut to the base of the original pit cut and was sealed by the upper fill. The depressions in pits 4, 8 and 12 appeared to be for rounded timbers and it is only the secondary squared socket in pit 4 that suggests a squared post. The evidence for having held posts is by no means certain but it is hard to find an alternative explanation for the sockets.

The pits had been cut quite deeply; the average depth from the top of the archaeological horizon was 0.6m, although the range varied from 0.27m to 1.0m. Combining this depth with that of the overlying topsoil, which averaged just over 0.3m, gives an average depth for each pit of just under 1m. The terrace on which the alignment is situated is a very stable geomorphological landform and has not experienced any significant modification through erosion or deposition during the Holocene. Therefore, it is likely that the depth of topsoil today is not much different to that existing when the alignment was built. As posts usually lie between one third to a quarter of their length below ground it can be estimated that the timbers that may have existed originally stood somewhere in the region of 2-3m above ground. However, as the pits are much wider than a tightly cut post pit, any freestanding post is likely to be at the shorter end of the range given the greater instability of such a wide pit. If the pits did not contain posts, then this feature may have served as a pit-defined boundary able to be thrown up in haste to demarcate an area.

Post hole

Towards the east end of the trench, between pit 4 and the unexcavated pit 2, a small truncated post hole was observed. This was an isolated feature and had no stratigraphic relationship with any of the pits, although it may well be associated. It is possible that this formed the basal remains of some additional structure, filling in the gaps between the timber uprights. This is only a possibility and remains unsubstantiated though it provides a tantalising hint as to what else may have existed as part of these landscape features.

Radiocarbon Dates
by Alex Bayliss, Peter Marshall and Clive Waddington

The excavation on the Redscar Wood pit alignment produced tiny fragments of short-lived wood species that were considered suitable for radiocarbon dating. Two samples from each pit, with the exception of pit 4 from which no material was available, were submitted for assay. All samples were dated at the Oxford Radiocarbon Accelerator Unit in 2001, processed according to methods outlined in Hedges *et al.* (1989), and measured using Accelerator Mass Spectrometry (Bronk Ramsey and Hedges 1997). OxA-10671, and OxA-10764 were measured as carbon dioxide targets, all other samples were converted to graphite.

The six results from the Redscar 2 pit alignment are statistically significantly different (T′=90.3; T′(5%)=11.1; ν=5), although the pairs of results from each pit are consistent (T′=3.5, OxA-10671 and OxA-10639; T′=1.4, OxA-10693 and OxA-10764; T′=1.4, OxA-10694–5; T′(5%)=3.8; ν=1) (Fig. 5.46). The results from pits 008 and 010 seem to fall in the mid to late Roman period, whilst those from pit 006 fall in the fifth and sixth centuries AD. Either all the Roman material is residual, and the primary construction of the alignment falls in the Post-Roman period or the alignment was constructed in the Roman period and was maintained into the Post-Roman period. As some of the pits were observed to have been affected by later disturbance these dates should be seen as provisional only. The dates contrast markedly with those obtained from the double pit alignment at Milfield North (Harding 1981), which appear to be dated to the centuries around 2000 cal BC (Fig. 5.47), although these dates were obtained at a time when the British Museum accelerator produced errors for which no correction can be calculated. Further work on this and other single pit alignments is necessary before the question of the chronology of these landscape features can be addressed with confidence.

Small Finds

A total of 21 lithics was recovered from the evaluation trench, with one lithic from the unstratified ploughsoil and the other 20 from the pit fills. As some of the lithics have Mesolithic characteristics, they are clearly residual pieces that have become incorporated into the pit fills during the infilling of the pits. The location of Mesolithic activity on the raised sand and gravel terraces of the Milfield Basin is well attested elsewhere and indeed it is these areas that the fieldwalking has shown to be the prime focus for Mesolithic occupation in the valley (Waddington 1999 and this volume). There is a large number of cores (9) implying that production of blanks for stone tools was an important activity in the vicinity of the site. All the cores were small in size for the production of microlith-sized bladelets. Again this indicates that many of these pieces are likely to be representative of earlier activity on the site prior to the construction of the pit alignment. One microlith, recovered from pit 8, lends further support to a Mesolithic presence. Two pieces which could be of later date are the end scraper from pit 10 and the awl-type tool from pit 6. A range of materials was used to make these lithics with ten made from chert, nine from agate, one from quartz and one from flint. The flint was light grey material of boulder clay origin, probably from the Northumberland coast or North-East Yorkshire, whereas all the other materials occur locally in the sediments of

Feature (context)	Diam (m)	Length (m)	Width (m)	Depth (m)	Description	Finds	Radiocarbon Age BP
Pit (4)		2.04	1.85	0.72	Oval pit with u-shaped profile along both axes and very steep sides. Upper fill of redeposited upcast consisting of light brown silty sand and weathered soil matrix with gravel inclusions. Sealed a lower fill of orange-brown sandy gravel.	1 agate flake from upper fill	
Pit (6)		2.78	1.6	1.0	Oval pit with u-shaped profile along both axes and very steep sides with homogeneous fill of redeposited upcast consisting of light brown silty sand and weathered soil matrix with gravel inclusions. Rabbit burrows noted in the base of the pit fill.	2 agate flakes 1 chert flake 1 agate core 1 chert awl (Fig. 5.49)	1625±45
Pit (8)		2.9	1.5	0.27	Oval pit with u-shaped profile along both axes and very steep sides with homogeneous fill of redeposited upcast consisting of light brown silty sand and weathered soil matrix with gravel inclusions.	2 agate flakes 1 chert flake 1 chert core (Fig. 5.49) 1 chert microlith (Fig. 5.49)	1519±35 1833±36 1765±45
Pit (10)		2.65	1.53	0.53	Oval pit with u-shaped profile along both axes and very steep sides with homogeneous fill of redeposited upcast consisting of light brown silty sand and weathered soil matrix with gravel inclusions.	1 agate test piece 2 chert flakes 1 chert core (Fig. 5.49) 1 flint end scraper (Fig. 5.49)	1867±35 1927±36
Pit (12)		1.65	1.2	0.45	Oval pit with depression at both ends of long axes suggesting it had held two posts or that one had replaced the other. No secondary cut apparent. Homogeneous fill of redeposited upcast consisting of light brown silty sand and weathered soil matrix with gravel inclusions.	1 agate flake 2 chert flakes 1 quartz flake	
Post hole (15)	0.2			0.15	This heavily truncated post hole had a circular shape and was filled with a loose black silty sand fill containing charcoal. The cut for the hole was straight-sided and cylindrical with a rounded base.		

Table 5.23. Feature summary from Redscar Wood pit alignment.

Context and Pit No.	Material	Lab No	Radiocarbon Age BP	$\delta^{13}C$ (‰)	Calibrated date (95% confidence)
6	*Prunus*	OxA-10671	1625±45	-24.4	cal AD 260–540
8/9	*Rhamnus cathartica*	OxA-10639	1519±35	-24.6	cal AD 430–640
8a	*Ericaceae*	Oxa-10693	1833±36	-25.0	cal AD 80–320
8b	*Ericaceae*	OxA-10639	1765±45	-25.1	cal AD 130–400
10a	*Ericaceae*	Oxa-10694	1867±35	-27.4	cal AD 60–240
10b	*Ericaceae*	OxA-10695	1927±36	-24.7	cal AD 10–140

Table 5.24. The Radiocarbon Dates from Redscar Wood pit Alignment.

the Milfield Basin. All stages in the core reduction sequence are represented in the assemblage, from test pieces and cortical flakes through to cores and retouched tools, indicating that primary knapping, tool production (and probably use) all took place on this site at some time. Selected pieces are illustrated in Fig. 5.49. The lithics are summarised below (Table 5.25) followed by a full description; measurements are not given for broken pieces.

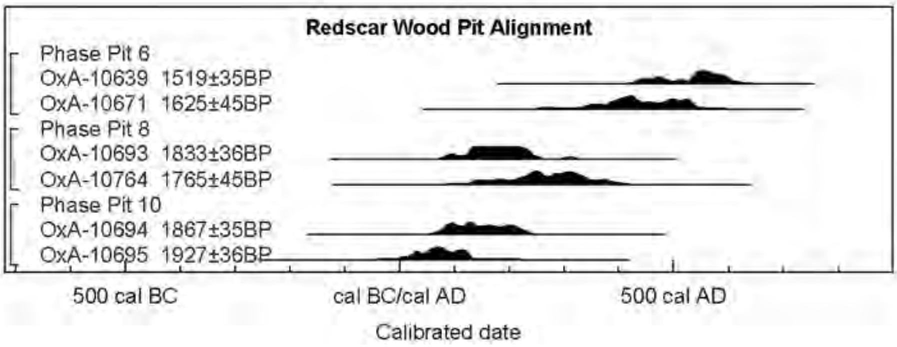


Figure 5.46. Calibrated dates from the Redscar Wood single pit alignment.

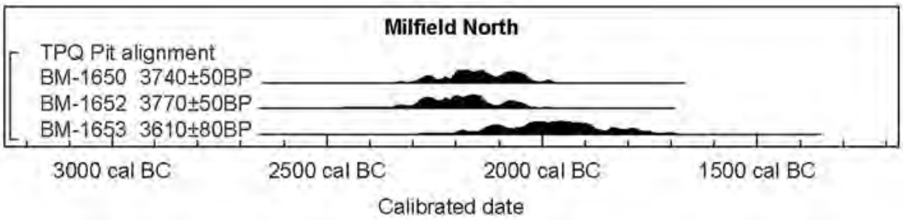


Figure 5.47. Calibration of Harding's (1981) radiocarbon dates for the Milfield North pit alignment.

Fig. 5.48. The Redscar Wood pit alignment during excavation.

Surface Find

1. A small banded agate platform core with microlithic blade removals. Maximum dimensions 19mm by 20mm. Mesolithic (illustrated Fig. 5.49).

Pit 4

2. Tiny broken agate chip (debitage).

Pit 6

3. A tiny and exhausted red agate core with microlithic blade removals. Maximum dimensions 12mm by 16mm. Mesolithic.
4. A small red-brown squat primary flake made from agate. Maximum dimensions 23mm long by 20mm wide by 16mm thick. Undiagnostic.
5. A modified grey-white chert flake, probably an awl. Edge-trimmed to make an oblique point with tip now slightly blunted. Maximum dimensions 29mm by 14mm by 12mm. Mesolithic/Neolithic affinities (illustrated Fig. 5.49).
6. A white-grey broken chert flake. Undiagnostic.
7. A tiny cream-coloured agate flake with tiny bladelet removals from its various facets. Maximum dimensions 10mm by 11mm by 6mm. Tiny size of blade removals suggests Mesolithic tradition.

Pit 8

8. A grey chert platform core for bladelet production. Maximum dimensions 30mm by 18mm. Tiny bladelet removals suggest blanks for microlith production. Late Mesolithic (illustrated Fig. 5.49).
9. Tiny red cortical agate chip. Maximum dimensions 7mm by 7mm by 7mm. Undiagnostic.
10. A tiny white-pink chert microlith made on a tiny blade with unifacial retouch on its dorsal surface around all edges. Maximum dimensions 13mm by 9mm by 4mm. Mesolithic (illustrated Fig. 5.49).
11. Tiny broken grey agate chip (debitage). Undiagnostic.

Lithic Type	Raw Material	Quantity	Context
Test Piece	Agate	1	10
Flakes	Agate	6	4, 6, 8, 12
Flakes	Chert	6	6, 8, 12
Cores	Agate	2	6, unstrat.
Cores	Chert	2	8, 10
Microlith	Chert	1	8
End Scraper	Flint	1	10
Awl	Chert	1	6
Total		**21**	

Table 5.25. Summary of Lithic Types.

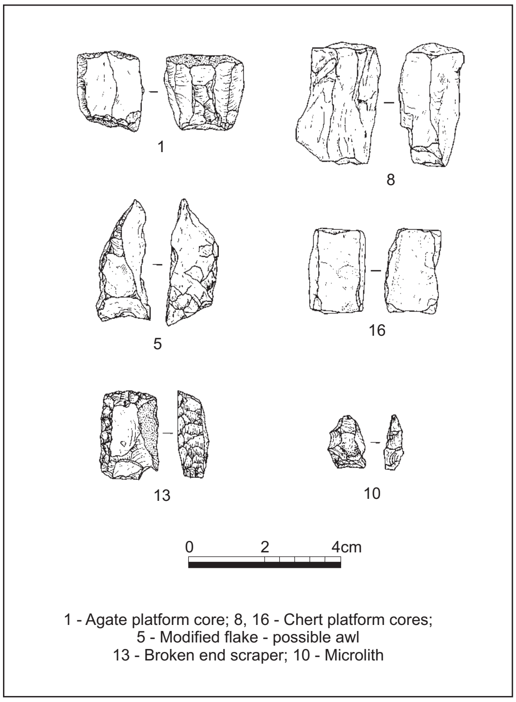


Fig. 5.49. Small finds from Redscar Wood pit alignment.

12. Tiny fawn-coloured chert flake/bladelet (debitage). Maximum dimensions 12mm by 5mm by 3mm. Undiagnostic.

Pit 10

13. A broken end scraper made on a blade of good quality light grey speckled flint of boulder clay origin. Retouch is abrupt and unifacial on the dorsal side. Late Mesolithic/Early Neolithic (illustrated Fig. 5.49).
14. Small grey agate test piece. Maximum dimensions 24mm by 25mm.
15. Tiny brown chert chip (debitage) with maximum dimensions of 8mm by 8mm by 4mm. Undiagnostic.
16. Small light brown chert platform core for microlith size bladelet production. Maximum dimensions 21mm by 14mm. Mesolithic affinities (illustrated Fig 5.49).
17. Small fawn chert flake/bladelet with triangular section and maximum dimensions of 18mm by 14mm by 11mm. Undiagnostic.

Pit 12

18. A tiny white-grey agate chip with maximum dimensions of 11mm by12mm by 9mm. Undiagnostic.
19. Tiny broken pink chert flake/bladelet segment. Undiagnostic.
20. An unmodified pink-grey quartz flake with maximum dimensions of 41mm by 22mm by 15mm. Undiagnostic.
21. A brown chert flake with maximum dimensions of 28mm by 21mm by 12mm. Undiagnostic.

Archaeobotanical Macrofossils
by Jacqui Huntley and Jacqui Cotton

The material extracted from contexts within the pit alignment at Redscar contained only a single charred grass seed, whereas durable waterlogged weed seeds were present in low quantities in the flots. Whilst they may represent bias in the data due to their preferential preservation over time they may simply reflect modern contamination.

Pollen
by Tony Stevenson

The only pit fill that contained reasonably preserved pollen was pit 6. Although 100% of the pollen was degraded it indicated a largely open landscape (50% tree pollen), ruderal pollen, ferns and sedges. However, the fill of pit 6 was disturbed by animal burrows and therefore the sample cannot be relied upon as it may be contaminated.

Discussion

The many pit alignments of the Milfield Basin are of considerable archaeological interest and have formed the subject of important fieldwork and debate for a number of years (Miket 1981; Harding 1981; Barber 1985; Waddington 1997). However, the understanding of pit alignments remains poor, with only a limited number of studies previously undertaken (see Waddington 1997 for discussion). Miket (1981) postulated a Late Neolithic context for the single pit alignments (of which the Redscar Wood alignment is one) based on the presence of Grooved Ware in the pit fills of the Ewart 1 pit alignment, and Harding (1981) obtained three Late Neolithic/Early Bronze Age radiocarbon dates for the double pit alignment at Milfield North, although these were from bulked material and made at a time when there was an error with British Museum dates (see Fig. 5.47 for latest calibration). Such dating was contested by Barber (1985), who viewed pit alignments as being a late prehistoric and Roman Iron Age phenomenon. Recent work, however, has put the existence of Late Neolithic/Early Bronze Age double pit alignments at least, beyond doubt (for reviews see Waddington 1997; Oswald *et al.* 2001). However,

Species	Context 4 Pit Fill	Context 6 Pit Fill	Context 8 Pit Fill	Context 10 Pit Fill	Context 12 Pit Fill
Volume Processed (litres)	**10**	**10**	**10**	**10**	**10**
Charred Remains					
Gramineae undiff. (Grass)	1				
Waterlogged Remains					
Chenopodium album (Orache)	1	1		1	1
Polygonum aviculare (Knotgrass)					
Fallopia convolvulus (Black bindweed)	2	2	1		
Trifolium spp (Clover)	1			1	1
Gramineae undiff. (Grass)	1		2		

Table 5.26. Summary of archaobotanical macrofossils results from Redscar Wood.

the need for radiocarbon dates from the single pit alignments of the Milfield Basin has remained an urgent priority if the dating of these monuments is to be resolved. The samples from this evaluation have contributed towards this wider question by opening up the debate again, as they consistently produced dates in the first half of the first millennium cal AD, centering on the Romano-British period, although it must be stressed that the dates are most likely to date the infilling of the pits and do not necessarily indicate the time when the pits were first made. It is possible that the dates could be on residual material but their consistency in the first half of the 1st millennium AD argues against this. However, as we are dealing with pits that may or may not have held posts, dating these features is a hazard-prone exercise as it is rare for dating samples functionally associated with the use, construction or abandonment of a pit to be acquired.

The dates from this site contrast with those from the Milfield North double pit alignment as well as with the contextual and pottery evidence that suggests the Ewart alignments are late Neolithic to Early Bronze Age date (Miket 1976; 1981; Waddington 1997). Currently the most plausible explanation appears to be that the pit alignments of the Milfield Basin are of widely different dates, presumably served different purposes and were perhaps of different structural form. This view, however, requires testing and the chronology of the different alignments resolved. Indeed these findings serve to add greater complexity to the debate, and as such support the need for more targeted research.

The evidence for timber posts remains ambiguous, although the results of this excavation, with the possible socket for a squared timber evident in one pit, and depressions that appear to have formed around undressed timbers in others, are suggestive. One pit, 12, contained two depressions, giving the impression that it had held two timbers, though one may have replaced the other. No obvious post pipes were evident, though the fills all consisted of unconsolidated redeposited upcast which is unlikely to retain such traces. No obvious packing stones were noted in the fills.

It is possible that these pits were dug as part of a single planned event in order to partition this area of landscape, although given the radiocarbon dating results it is also possible that further pits were added or modified over time. Some, if not all of the pits may have held timber uprights held in place by redeposition of the pit upcast as backfill. There was no surviving evidence to indicate whether some kind of screen had existed between each timber upright though the single surviving post hole (albeit with no direct stratigraphic relationship) could hint towards such a possibility. Alternatively there may not have been any linking barrier between the uprights. Either way the pit alignment certainly served to bound an area, whether as a symbolic or physical barrier. It conjoins with a longer pit alignment that dissects the dry gravel 'island' at right angles to this pit alignment to form a large scale partition of this area. This creates a fascinating landscape feature in which a raised area of dry ground, situated in the geographic centre of the valley and surrounded on all sides by wet ground, is divided up by boundaries which control access on to, and over it. This dry 'island' was divided into at least three discrete areas by the construction of these pit alignments (Fig. 5.44). Gaps in the alignment can be observed on the aerial photographs, indicating that access across this area of land was controlled. Whether they were used for stock control, defining cultivation plots, ownership boundaries or perhaps as markers of 'ritual' precincts is difficult to say, but clearly this area of land was of sufficient importance to require formal partition and control over access.

MAELMIN WEST

Introduction

The area of land referred to as Maelmin West lies at Kimmerston Road End immediately west of the extensive cropmarks of the medieval royal estate centre of Maelmin (Gates and O'Brien 1988) and at the north end of the disused WWII airfield (Fig. 5.50). Located at NT940336 at the south end of Milfield village, these excavations took place as an evaluation and recording exercise in advance of the construction of a heritage trail that included a small car park and reconstruction of the Milfield North henge. Initially four linear evaluation trenches were opened, followed by a larger square trench over the area to be occupied by the reconstruction (Fig. 5.51). The site is situated in the heart of the Milfield Basin (SMR numbers NT93SW134, 135, 136) on the flat fluvio-deltaic sand and gravel outwash terrace with views circumscribed by the encircling horizon of hills. The site is positioned around the 44m contour 550m to the east of the River Till. The river is not visible from the site as it is inset below the sand and gravel terrace. The soil cover on the site has been characterised by Payton (1980) as a humic brown podzolic soil. It is very stony but free draining and winter wheat thrives on it. The land is currently given over to sheep pasture although it was ploughed on a number of occasions up until the 1990s. Under favourable lighting conditions the vague surface expression of broad ridge and furrow can be observed running east to west across the site and in the east half of the field a low curving mound can be seen following the course of the double palisaded enclosure surrounding the medieval township of Maelmin, and visible also as

Fig. 5.50. Aerial photograph showing the area of the Maelmin West site now occupied by the 'Maelmin Heritage Trail'.

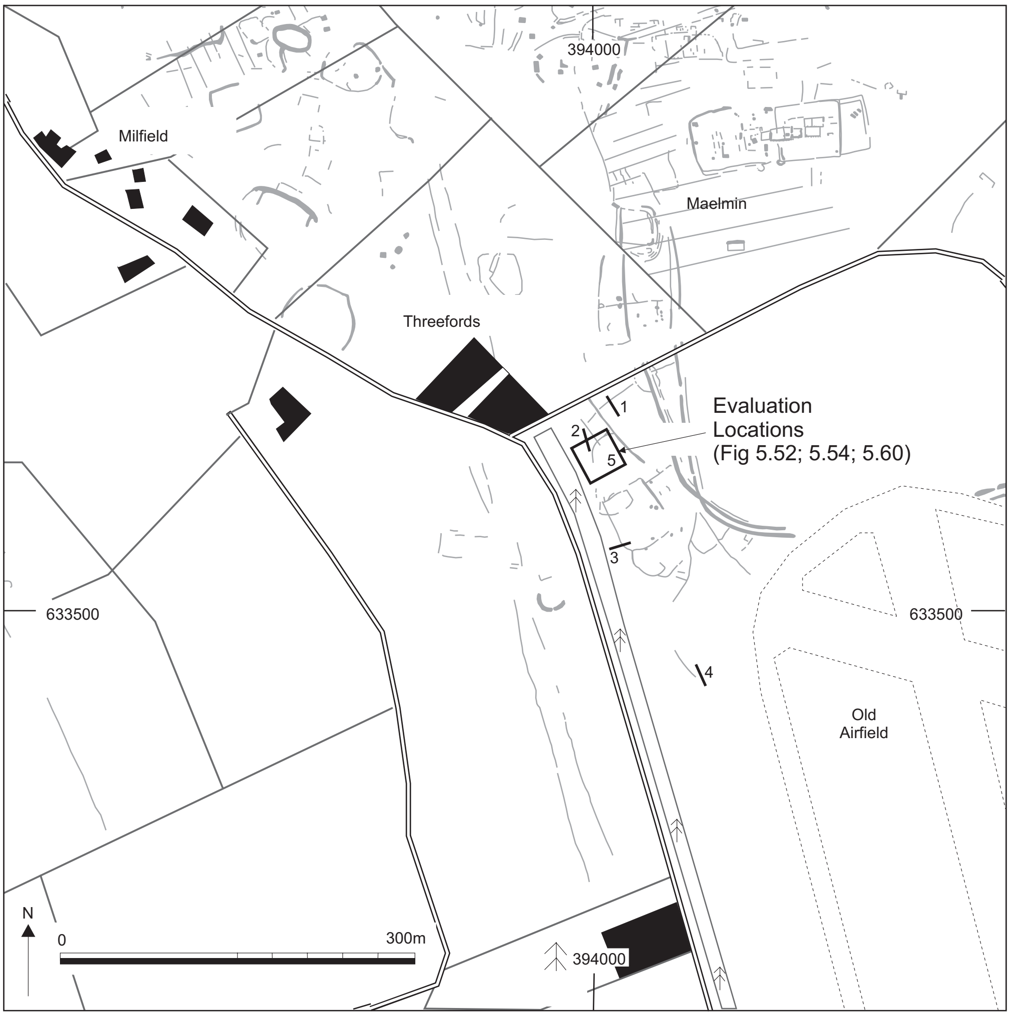


Fig. 5.51. Maelmin West location plan.

cropmarks on aerial photographs (Gates and O'Brien 1988). The disused airfield lies to the immediate south of the site, although much of the airfield has now been quarried out as a result of gravel extraction (see Johnson and Waddington in press).

Excavation

Four evaluation trenches were opened in the area of land to be used for the heritage trail. Two of the trenches, 2 and 4, were devoid of archaeology, while the other two trenches, 1 and 3, contained archaeological deposits. A larger trench, 5, was opened over the area selected for the henge reconstruction and this too contained archaeological deposits. The modern turf and topsoil on all the trenches were removed by machine and the remaining contexts cleaned and excavated by hand. The topsoil is known to have been systematically ploughed during the post-war period so any archaeological remains within this horizon have been obliterated, leaving only the truncated deposits below. However, in recent decades the land has been used for pasture rather than cultivation, leaving the topsoil horizon a relict ploughzone. Apart from modern pottery sherds and occasional shards of glass the only archaeological finds recovered from the topsoil were three struck lithics found above trenches 1 and 5. The archaeological remains survived as fillings of negative features cut into the substratum and included post holes, pits and ditches. Pits were excavated by half-section and the ditches examined by sections cut across them. The structural remains survived only at foundation depth as all evidence for floor levels and superstructures had been lost. There is no evidence for soil erosion having taken place on what is a geomorphically stable surface. It is probable that the ground surface today lies close to the early medieval ground level. All measurements of depths of features given in the tables are taken from the beginning of the archaeological horizon immediately below the ploughsoil. As an approximate guide, 0.35m should be added to these measurements to achieve a more accurate depth for these features from their contemporary ground surface.

Trench 1

A single broken light grey flint flake with some patina development was the only archaeological find retrieved from the topsoil of the trench. The flake had been restruck subsequent to its initial flaking and this secondary flaking included the removal of two narrow parallel-sided blades – a flaking style most typical of Mesolithic and Early Neolithic flintworking traditions. Being unstratified, this find denotes little except for the presence of secondary flaking activities in this area by prehistoric inhabitants.

Trench 1 revealed evidence for what is thought to be part of a rectangular building consisting of a series of post holes arranged in a regular pattern (Fig. 5.52) together with a modern field drain running east to west across the trench at its north end. Although only part of the structure was revealed by the evaluation trench the regular layout suggests that this building was rectangular in plan.

The post holes were narrow, straight-sided and deep and had clearly been cut to make a tight fit around the posts. The packing stones tended to be located towards the centre of the holes, consistent with slumping after the extraction of a post. Post holes 3, 5 and 8 and stakehole 7 ran in a north to south direction over a distance of 3.65m (Fig. 5.53). The second row of post holes runs at right angles to the previous alignment and includes post hole 8 along its course. Post holes 8, 10 and 12 and stakehole 11 run east to west and run into the trench edges on each side. Therefore, the length and width of the structure remains unknown. A possible third row of post holes, parallel with post holes 8, 10 and 12, is represented by post holes 6 and 13, which are also aligned east to west. These may indicate an internal division within the structure running along its long axis.

Although no post pipes could be identified, the estimated diameter of the posts contained in the holes was 0.12–0.15m based on the width of the post holes at their base and the width between packing stones found in the central fills. Although the holes measured on average 0.45m below the top of the substratum, by adding the depth of the topsoil to this measurement, which on this part of the trench measured 0.45m deep, it can be estimated that the posts were originally set around 0.9m into the ground. Assuming that the posts would sit between roughly a third and a quarter in the ground it can be inferred that these posts stood somewhere around 2–3m above ground. Based on these calculations this structure is perhaps best conceived as a timber post-built building typical on Anglo-Saxon sites elsewhere in the valley.

As the substratum into which these holes were cut was sand and gravel it is difficult to make a post stable if a wide hole is cut. The subsequent experimental reconstruction of the Milfield North henge nearby (see Waddington 2004b for more detail) revealed that substantial posts (0.15m diameter) standing over 2m above ground could be set very firmly in the ground in post holes just 0.5m deep if a narrow tight-fitting post hole was used.

No artefacts, organic or charred residues were recovered and consequently no material was available to date the structure directly.

These post holes form what appears to be a regular building constructed using the post and panel technique, recalling the post hole buildings excavated at Thirlings (O'Brien and Miket 1991) and Yeavering

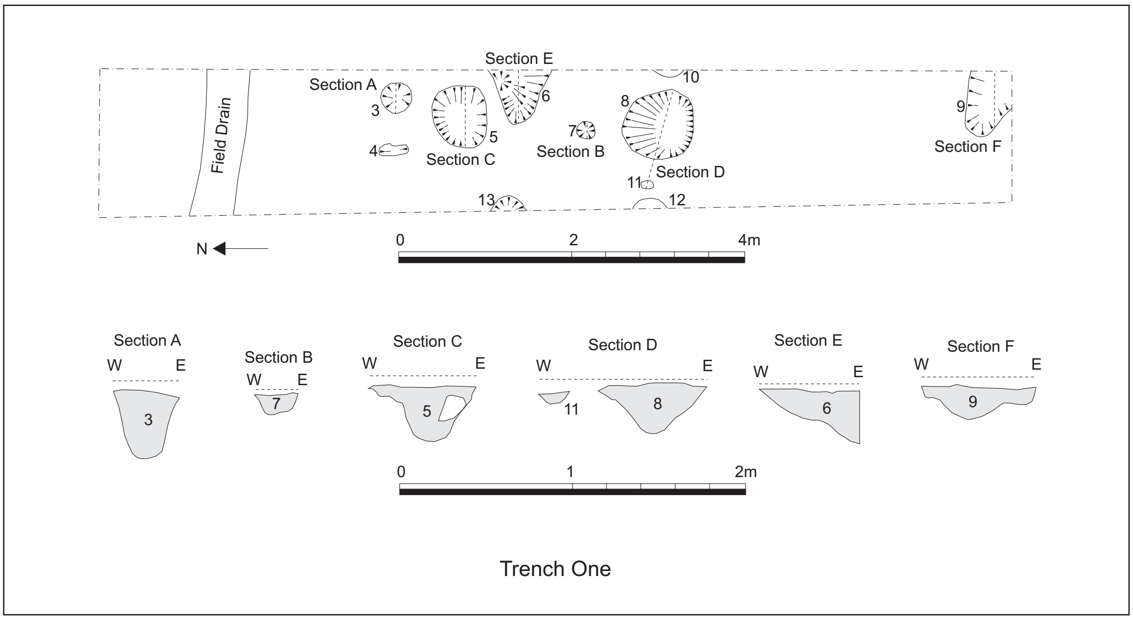


Fig. 5.52. Maelmin West Trench 1 plan and section drawings.

Fig. 5.53. View of the post-built building remains at Maelmin West Trench 1.

(Hope-Taylor 1977). It is important to note that the post hole buildings excavated at Thirlings (O'Brien and Miket 1991, 72) or Cheviot Quarry (Johnson and Waddington in press) were not visible as cropmarks prior to the excavations, and this was also the case with the structure at Maelmin West. Post hole buildings G, H and I at Thirlings had been constructed with post holes containing squared timbers set in pairs to form rectangular buildings measuring 9.72m by 4.96m, 9.28m by 5.32m, and 9.52m by 4.6m respectively (O'Brien and Miket 1991, 76). The post pits in these buildings varied in depth below the ploughsoil from 0.05m to 0.3m and were evidently more heavily truncated than the post hole structure at Maelmin West. These buildings are thought to have held walls made from a double plank wall construction method. The post holes in trench 1 show no evidence for having held double planks but rather a single timber post in each. The closest match for this type of construction are buildings E, F and R at Thirlings which were also rectangular and had approximate dimensions of 6.3m by 3.9m, 6.54m by 4.16m and 5.44m by 3.9m respectively and the three buildings at Cheviot Quarry North (Johnson and Waddington in press). The central post hole in building F at Thirlings led the excavators to interpret this building as having a pointed roof sloping down on all four sides, however, there was no central post evident in buildings E or R. The form of the roof for the structure in trench 1, therefore, remains hypothetical and it is thought that the remains evident in the small evaluation trench are too few to warrant speculative reconstruction.

As the rectangular structure identified at Maelmin West lies approximately 70m outside the double palisaded enclosure surrounding the town of Maelmin, it is concluded that this building forms part of an extramural settlement. Bede, writing around AD731, states

Feature (context)	Diam (m)	Length (m)	Width (m)	Depth (m)	Description
Post hole 3	0.41			0.44	Circular post hole with u-shaped profile and very steep sides with dark grey stony fill and packing stones
Post hole 5	0.47			0.44	Circular post hole with u-shaped profile and very steep sides with dark grey stony fill and packing stones
Post hole 6	0.56			0.3	Circular post hole with u-shaped profile and very steep sides with dark grey stony fill and packing stones
Stakehole 7	0.18			0.08	A u-shaped stakehole with dark grey fill including compacted stone
Post hole 8	0.52			0.48	Circular post hole with u-shaped profile and very steep sides with dark grey stony fill and packing stones
Post hole 10	0.42			?	Not excavated as only partly exposed in trench edge
Stakehole 11	0.14			0.09	Circular stakehole with dark grey stony and silty sand fill
Post hole 12	0.35			?	Not excavated as only partly exposed in trench edge
Post hole 13	0.36			?	Not excavated as only partly exposed in trench edge. Packing stones visible on exposed surface
Pit 9		?	?	0.34	Pit with bowl-shaped profile. Dark grey loamy sand fill with occasional small stones, no packing material

Table 5.27. Feature summary from Trench 1 at Maelmin West.

that after the reign of King Edwin of Northumbria the town of Ad Gefrin (Yeavering), "was abandoned by the later kings, who built another at a place called Maelmin" (Sherley-Price 1968, 129). Therefore, the town at Maelmin appears to have been established in the mid-7th century and with time may have grown out of the confines of the great palisade to include extramural settlement. The other possibility is that the extramural settlement predates the royal town, though this is unlikely given the radiocarbon date from the post hole associated with the field system (see below).

Trench 3

Trench 3 revealed a linear ditch (context 14) running east to west with two additional linear ditches joining it: one from the north and the other from the south (Fig. 5.54). The main ditch (context 14) was v-shaped in profile with a slight ledge running along its north side. It measured 1.35m across at the start of the archaeological horizon and had a maximum depth of 0.4m. The fill of the ditch consisted of a dark brown loamy gravel which for the most part consisted of redeposited natural gravel. No recuts through the fill were evident. As the fill was homogeneous this implies that the ditch was at some point deliberately backfilled rather than gradually silted up over time. A broken clay pipe stem with stamps of the word 'Edinb…..' visible on one side and '…hite & Co.' on the other was recovered from the ditch fill. This clay pipe fragment, made by what appears to be an Edinburgh-based company (probably White & Co.), was located 0.12m deep within the fill of the ditch. As there was no evidence for any disturbance to this fill, this find therefore provides a *teminus ante quem* for the backfilling of the ditch. This ditch can be traced on aerial photographs tracking roughly east to west across the field and appears to have formed part of a system of land division.

A setting of substantial packing stones (context 15) was identified, set within the fill of the linear ditch immediately opposite where the northern ditch (context 17) intersects with the main ditch (context 14). These packing stones were *in situ* and a section across the setting revealed a post pipe measuring 0.1m wide. This feature is evidently the remains of a stone-packed timber upright that stood at an intersection along the course of the main linear boundary. The stone packing was found 0.52m below the gravel surface. As the post was set into ditch fill this timber boundary represents a second phase of the same boundary system after the ditches had been infilled. The discard of the broken pipe stem is probably contemporary with the construction of this second phase of the boundary.

The southern abutting ditch (context 16) was also sectioned. It measured 1.3m across at the gravel surface and had a maximum depth of 0.36m. It also had a v-shaped profile and was of virtually identical form to the main east to west ditch with the same dark brown gravel fill. No finds were retrieved from this cutting. Insufficient length of the northern abutting ditch was present in this trench for it to be sectioned or its width measured. However, on the basis of surface inspection it appeared to be of the same form and had the same fill as the other two ditches, and is therefore thought to be contemporary.

The features observed in trench 3 are evidently boundary features that divide this area of land,

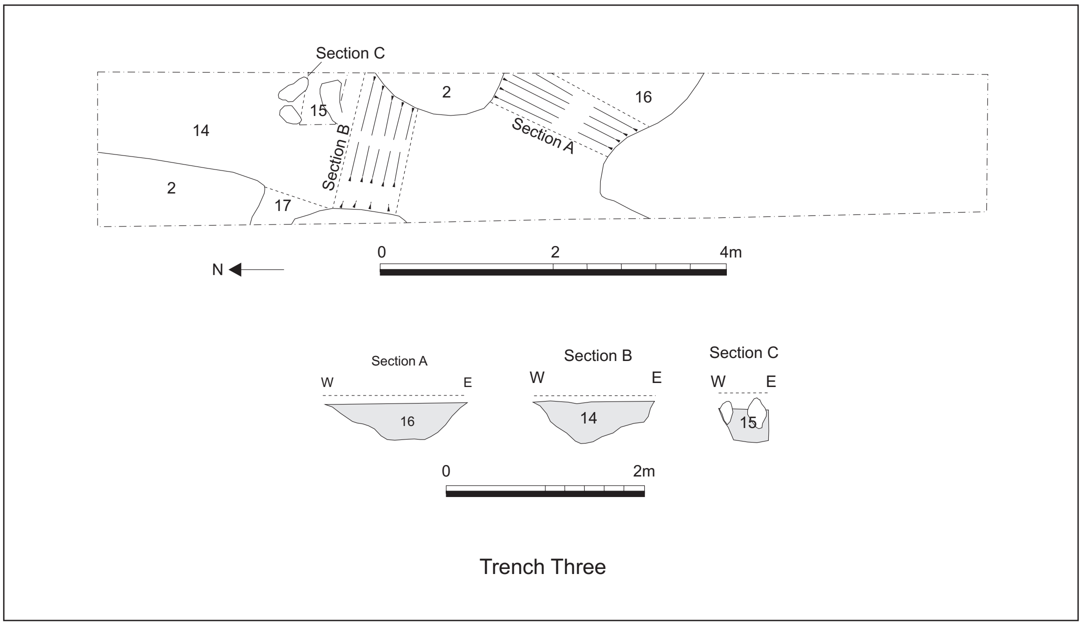


Fig. 5.54. Maelmin West Trench 3 plan and section drawings.

presumably into fields or agricultural parcels. The original boundary took the form of a v-shaped ditch with the upcast perhaps used to make an accompanying bank. A second phase was identified consisting of wooden posts inserted into the backfilled ditch presumably to form a fenced area. However, the evidence for this second phase is based only on the discovery of one stone-packed post hole. If the fence was continuous then its construction could perhaps signal a shift from arable to livestock farming. The fragment of clay pipe stem found in the ditch fill implies that the abandonment of the first structural phase and the beginning of the second took place around the late 18th–early 19th centuries, during the enclosure period when agricultural production was intensified to meet the demands of an expanding population and several decades of war.

Trench 5

Trench 5 was excavated in order to fully record any archaeological remains below the area where the henge reconstruction was to be placed. A geophysical survey was undertaken over the area in order to determine areas of activity to be avoided for the location of the reconstruction.

The survey was centred on NT 940337 and extended over an area of 0.7ha. The site was bordered on the west by a linear plantation parallel with the A697 trunk road and to the east by the constraint area of the scheduled ancient monument of Maelmin. Given that the underlying sediments consisted of sand and gravels this indicated the general suitability of magnetometry as the preferred method. The survey was conducted using a Fluxgate Gradiometer with 1m parallel traverses and 0.25m sample intervals, within a 30m grid. An automatic trigger was employed and zero drift was recorded at the end of each grid when the instrument recalibrated. The direction of the survey was east to west.

The results were plotted as grey scale, trace and relief plots and from these data an interpretive plan was created (Fig. 5.55). The readings were computed using Geoplot 3 data processing software. Modern features were observed within the survey area, notably two parallel linear bipolar anomalies, which the subsequent excavation in trench 5 revealed to be former airfield service trenches. A more intense linear bipolar anomaly was also observed and is probably a pipeline associated with the nearby gas pumping facility.

Of more archaeological interest however, were two positive parallel linear anomalies running roughly north to south across the survey area and which could be observed some 25m in length and 2m in width. These are interpreted as ditches and are thought to be a section of the double palisade ditches surrounding

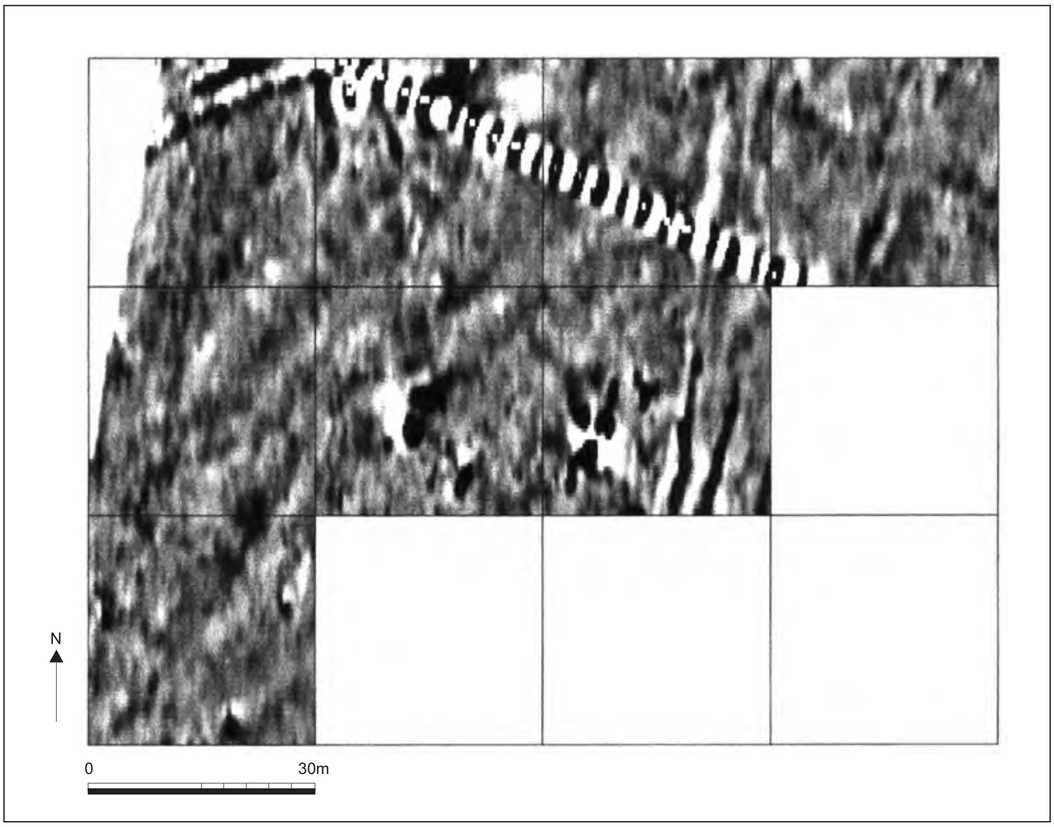


Fig. 5.55. Maelmin West geophysical plot.

the town of Maelmin on its west side. These features appear to have been cut and disturbed by the probable pipeline but to continue to the north as slight but perceptible positive anomalies. If this is the case some stone structure in the palisade construction can be postulated. Further linear positive anomalies can be observed to the east of the linear features, thought to be the double palisade suggestive of structural features within the town of Maelmin. To the west of the probable palisade features was a series of faint anomalies including linear positive anomalies some 45 to 50m in length. Trench 5 extended over this latter area and these features were found on excavation not to indicate archaeological features but rather appeared to reflect differences between underlying sediments where sand and gravel deposits butted up to each other.

The linear anomalies thought to be the double palisade around the medieval town of Maelmin and the features to the east of this were not sampled by excavation as the object of the geophysical work was to identify archaeological features to be avoided by the henge reconstruction. The survey was successful in identifying such features and so trench 5 was located at the west margin of the geophysical survey area to cause least impact on the archaeological remains. This survey has been of further use as it has demonstrated the survival of integral archaeological deposits associated with the medieval town of Maelmin buried below a field that has experienced intensive ploughing in the past.

A trench measuring 36m by 36m was opened over the site selected for the reconstruction (Figs 5.56–5.57). The sand and gravel terrace surface turned out to be of typically uneven character with shallow hollows and slight ridges. These natural undulations were filled with dark subsoil material and excavation proved them to be non-archaeological features. The linear magnetic anomalies picked up by the geophysical survey in the north-west area of the site (Fig. 5.60) proved to be two parallel service ditches for the WWII airfield containing electrical wires and service bricks.

The topsoil varied in depth across the trench from 0.3m to 0.45m, though in general it averaged 0.35m deep. It contained a variety of unstratified finds including modern and post-medieval pottery sherds, bottle glass and two lithics; one each of flint and agate and both of probable Mesolithic date (Fig. 5.61). The flint piece is a core made from a dark grey flint with white speckles. The single platform nature of the core, its small size and tiny blade removal scars are consistent with Mesolithic flaking traditions and microlith technology. Two areas of non-chalk cortex remain on the dorsal surface that indicate a boulder clay origin for this piece. It has maximum dimensions of 25mm in length and is 30mm across.

Fig. 5.56. Aerial photograph of Maelmin West Trench 5.

Fig. 5.57. View of Trench 5 medieval postholes under excavation.

The agate piece, of red-purple-brown hue, is also a core. The small size of this single platform core, together with the occasional blade removal scar, suggest that this piece also belongs to a Mesolithic context. It has maximum dimensions of 28mm by 23mm. The agate occurs locally and can be found in the fluvio-deltaic sand and gravel substratum on which the trench is located.

The ditch features included a curvilinear ditch (context 25) which ran from the east trench edge and curved round towards the south end of the trench before fading out 1.7m before the southern trench edge (Fig. 5.57). This feature varied in width from 1.28m wide at its north-eastern end to 0.34m wide at its southern end. Due to the unweathered and unsorted nature of the dark grey silty sand fill, and the very clean and regular edges of the cut, this ditch feature was not thought to be of any great antiquity. It was sectioned in two places with both sections revealing a regular u-shaped ditch with steep sides and rounded base with the appearance of having been cut by machine. No finds were recovered. The ditch cut a pit containing a rotted, though modern, squared wooden post, confirming the modern date of both features. Associated with this ditch were a number of slight splays, or arms, which led off from it, and also a linear ditch (context 31) which conjoined with it at its north-western end. The section across this ditch (31) showed that it had an almost identical profile as the conjoining ditch (context 25). This ditch system lies 125m beyond the end of the WWII runways and is thought to be part of ancillary features associated with the use of the airfield during the 1940s.

A series of seven post holes was observed in the south half of the trench (Fig. 5.57), six of which were positioned in a line running approximately east to west, while the seventh lay perpendicular to this alignment.

The post holes averaged 0.38m in diameter and 0.25m deep from the start of the archaeological horizon. Therefore these post holes were probably cut around 0.6m below ground when originally constructed. The post holes all contained a dark brown compact silty gravel fill with substantial packing stones. No recuts or secondary fills could be observed in any of the fills, indicating that this setting of posts had been constructed and used as part of a single construction event. Although truncated by the ploughzone, the remaining basal sections of the post holes revealed that they were generally steep-sided and some had hollows at their base where it appeared that a tapering or pointed post had been driven in. No artefacts were acquired from any of the post holes and the only fill to yield any organic material was that from the off-set post hole (context 12).

Radiocarbon Dates
by Alex Bayliss, Peter Marshall and Clive Waddington

A single charred breadwheat sample from the fill of post hole 12 was submitted for radiocarbon dating.

This single determination provides a calibrated date of cal AD 680–890 (Fig. 5.58), which is consistent with the assumed occupation of Maelmin based on Bede's statement (see above), written in the earlier part of the 8th century.

Archaeobotanical Macrofossils
by Jacqui Huntley

Two samples of charred wood were recovered from a depth of 0.25m in the fill of post hole 12, both of which were fragments of oak. However, neither was considered suitable for radiocarbon dating as they were not demonstrably sap wood or twigs. Five litres of the post hole fill were floated in order to identify any other plant remains. A total of 24 charred seeds was found, together with 9 waterlogged seeds and 3 fragments of insect.

The waterlogged species present are indicators of cultivated or disturbed ground but may not be contemporary with the archaeology. The presence of the charred cereal grains implies that cereal cultivation took place in this area at the time this post hole setting was being constructed. Although 15 of the cereal seeds remained unidentifiable at species level as a result of their poor state of preservation, the presence of oats, barley and breadwheat could be positively identified.

Pollen
by Tony Stevenson

A single pollen slide was prepared from the fill of context 11 and contained the taxa shown in Table 5.31.

This pollen assemblage is indicative of grassland with nearby cereal cultivation and includes a wide

Feature (context)	Diam (m)	Length (m)	Width (m)	Depth (m)	Description	Finds	Calibrated age (95% confidence)
Post hole (12)		0.38	0.55	0.46	Roughly circular post hole with extraction ramp and otherwise steep sides filled with very compact dark brown silty gravel with stone packing	Oats Barley Breadwheat Charred oak fragments	cal AD 680–890
Post hole (14)	0.33			0.19	Circular post hole with steep sides filled with very compact dark brown silty gravel with substantial packing stones		
Post hole (16)		0.45	0.60	0.35	Roughly circular post hole with shelf on one side filled with very compact medium brown silty gravel with substantial packing stones		
Post hole (18)	0.29			0.23	Circular post hole with steep sides filled with grey-brown loose silty gravel		
Post hole (20)	0.46			0.10	Circular post hole with sloping sides filled with grey-brown clay silt with stone packing		
Post hole (22)	0.33			0.19	Circular post hole with steep sides filled with very compact dark brown silty gravel	Charcoal flecks	
Post hole (24)	0.33			0.24	Circular post hole with steep sides filled with very compact dark brown sandy silt with packing stones		

Table 5.28. Summary of posthole characteristics from Trench 5.

Context	Material	Lab No	Radiocarbon Age BP	$\delta^{13}C$ (‰)	Calibrated date (95% confidence)
12 Post hole Fill	Charred breadwheat grain	Beta-139716	1220±30	-22.9	cal AD 680–890

Table 5.29. The radiocarbon date from the Maelmin West posthole.

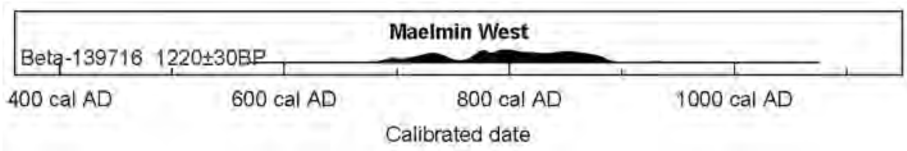


Fig. 5.58. Calibration of the radiocarbon date from the Maelmin West site.

Species	**Context 11**
Charred Seeds (counts)	
Avena spp (Oat)	4
Hordeum spp (barley)	2
Triticum aestivum (Breadwheat)	3
Cerealia indet. (Indeterminate Cereal)	15
Waterlogged Seeds (counts)	
Polygonum aviculare *(Knotweed)*	1
Trifolium spp (Clover)	2
Chenopodium album & *Atriplex* spp (Orache/Goosefoot)	6

Table 5.30. Seeds recovered from Maelmin West posthole 12.

Species	**Common Name**	**% of Total Pollen**
Gramineae	Grasses	63%
Cyperaceae	Sedge Family	8%
Cerealia	Unidentified cereal	4%
Compositae (Liguliflorae)	Dandelion	4.5%
Filicales	Fern family	5.5%
Pteridium	Bracken	3%
Valeriana, *Polypodium*, Chenopodiaceae, *Corylus*, *Calluna*, *Anthemis*, *Succisa*, *Galium*, Cruciferae, *Polygonum bistorta*	Various	0.5–1.0%

Table 5.31. Summary of pollen results from Maelmin West posthole 12.

range of ground disturbance indicators associated with human activity. Four percent cereal-type pollen is high given that these types do not disperse far from source. Such values indicate either a field setting or that straw was being used in the immediate vicinity.

Discussion

As the post holes in trench 5 are set out in a regular line too far apart and too insubstantial to form part of a building they are considered to have held the timber uprights for a fenceline, with the offset post hole (context 12) forming part of a second fence that joins it from the south. The vestigial remains of ridge and furrow tracking east to west and virtually parallel with the fence alignment could be observed after the trench was cleaned back. This evidence took the form of slight grooves where the furrows had been scarred into the subsoil surface. Ephemeral traces of ridge and furrow can still be observed on the surface of this field tracking east to west under low-light conditions. It is therefore concluded that on the basis of the radiocarbon determination the post hole arrangement represents the remains of an arable in-field system contemporary with the royal Anglian township of Maelmin, defined by wooden fences probably of post and rail construction. These fields were used for the cultivation of oats, barley and breadwheat and butted up close to the extramural buildings known to have been constructed on the west side of the town outside the palisade as indicated by the findings from Trench 1.

The structure identified in Trench 1 adds to the picture that is being built up of the structural form of the town. The detailed aerial photograph transcription undertaken by Gates and O'Brien (1988) identified perhaps 40 or more *Grubenhaüser* and this evaluation has now added the presence of a post-built building. In addition to the massive double palisaded enclosure, the presence of this number of wooden structures in and around the town represents a huge demand on the wood resources of the region and this must have resulted in a rapid and significant depletion of the tree cover sometime around the late 7th to early 8th century. Furthermore the quantity of thatch required to cover many of these buildings may have had a significant impact on other areas of vegetation such as reed beds along the riverbank. Perhaps the clearance of tree cover for timber was managed so that it also served to open up new areas of landscape for cultivation and pasture. This heavy demand for woodland may have been possible thanks to the existence of an efficient woodland management system, as later medieval records show carriage of timber (truncage) from Whittingham to Bamburgh, which is a distance of some 30km (O'Brien 2002). Even if the resources needed to construct Maelmin were sourced around the greater region, the demand on timber and associated building materials must have been considerable. The reconstruction of one of the Thirlings buildings at Bede's World used 30,500kg of green oak from 50–60 year old trees, 70 ash poles for rafters, 1800 bundles of reed and 150 of sedge for thatch, together with willow and hazel rods for wattle and approximately 30 tons of clay for daubing (Mills 1999). Moreover, this building is only about a quarter of the floor area of the Great Hall at Maelmin, and the town contains dozens of buildings of Thirlings size as well as being surrounded by a stout double palisade. The palaeoenvironmental record may yet shed light on the impact this new town had on the basin and surrounding areas of Bernicia.

According to Bede, Maelmin is known as the successor royal estate to Ad Gefrin and evidence for cereal cultivation close to this centre is to be expected. Recently O'Brien has made the case for this town having formed the centre for a shire that had originally been administered from the royal estate at Ad Gefrin. The settlement at Thirlings, which Bayesian modelling suggests started in *cal AD 420–570 (68% probability)* and ended in *cal AD 560–680 (68% probability*; see Fig. 5.59) was perhaps one of the farming settlements that paid a grain levy to the royal estate at Ad Gefrin and perhaps latterly Maelmin. The estimated date for the Thirlings site suggests its contemporaneity with Ad Gefrin rather than Maelmin, so it remains unknown whether this settlement continued in use when Maelmin became the estate centre.

Why Maelmin was selected as the successor to Ad Gefrin remains an issue of some interest. However, it is significant to note that Maelmin is situated at a key strategic location in the centre of the Milfield Basin. It occupies the pinch point in the valley where the floodplain constricts. This is the natural crossing point of the river linking the east and west parts of the valley together. It is also located on the main north to south route through the valley and in this sense controls access north to south and east to west across the region. Recent research on the routes of Roman and pre-Roman roads (Bishop pers comm) has identified a Roman road branching off from the Devil's Causeway at Hedgeley Moor north of Powburn and following broadly the line taken by the A697 through the Milfield Basin to Coldstream. Bishop has argued that this road has been in use ever since and that the battle of Hedgeley Moor took place at the junction of this road with the Devil's Causeway. This road would have passed directly by the place chosen as the royal town of Maelmin and the presence of this arterial route may have been a key factor in the decision to locate Maelmin where it is. In addition to being strategically located, Maelmin also occupies the geographic centre of the plain, providing easy access to and from all areas of the surrounding landscape. Being positioned on a bluff above the River Till the town would have enjoyed easy access to freshwater and the rich riverine resources, such as fish and wildfowl, while at the same time enjoying free-draining ground free from flood risk and without problems of stagnant water and insects associated with wetland locations elsewhere in the basin. The geoarchaeological work undertaken as part of this project has been able to demonstrate that the River Till followed a slightly different course during the occupation of Maelmin than it does today. A former course of the Till, surviving as a sinuous palaeochannel, lies 250m further east than the present river course. A radiocarbon determination taken from near the base of this fill at NT94553423 indicates channel abandonment occurred shortly before *c.*AD 1030–1280 (840±60 BP Beta-119827). This means that there would have been an area of floodplain separating the river from the bluff on which Maelmin is located. Today the river course runs hard up against the bluff. There is no evidence from the aerial photographs that the double palisade around Maelmin ever extended along the east edge of the bluff although lateral movement by the river may have eroded any remains along this section. Even if there was some continuation of the

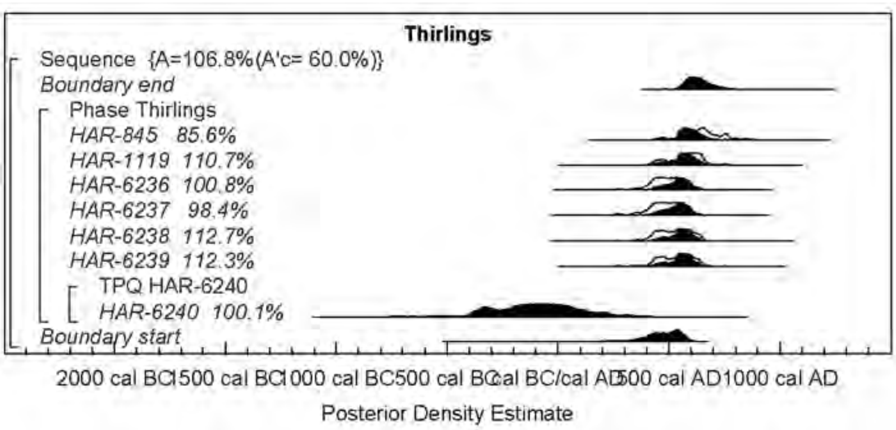


Fig. 5.59. A posterior density estimate for the early medieval settlement at Thirlings.

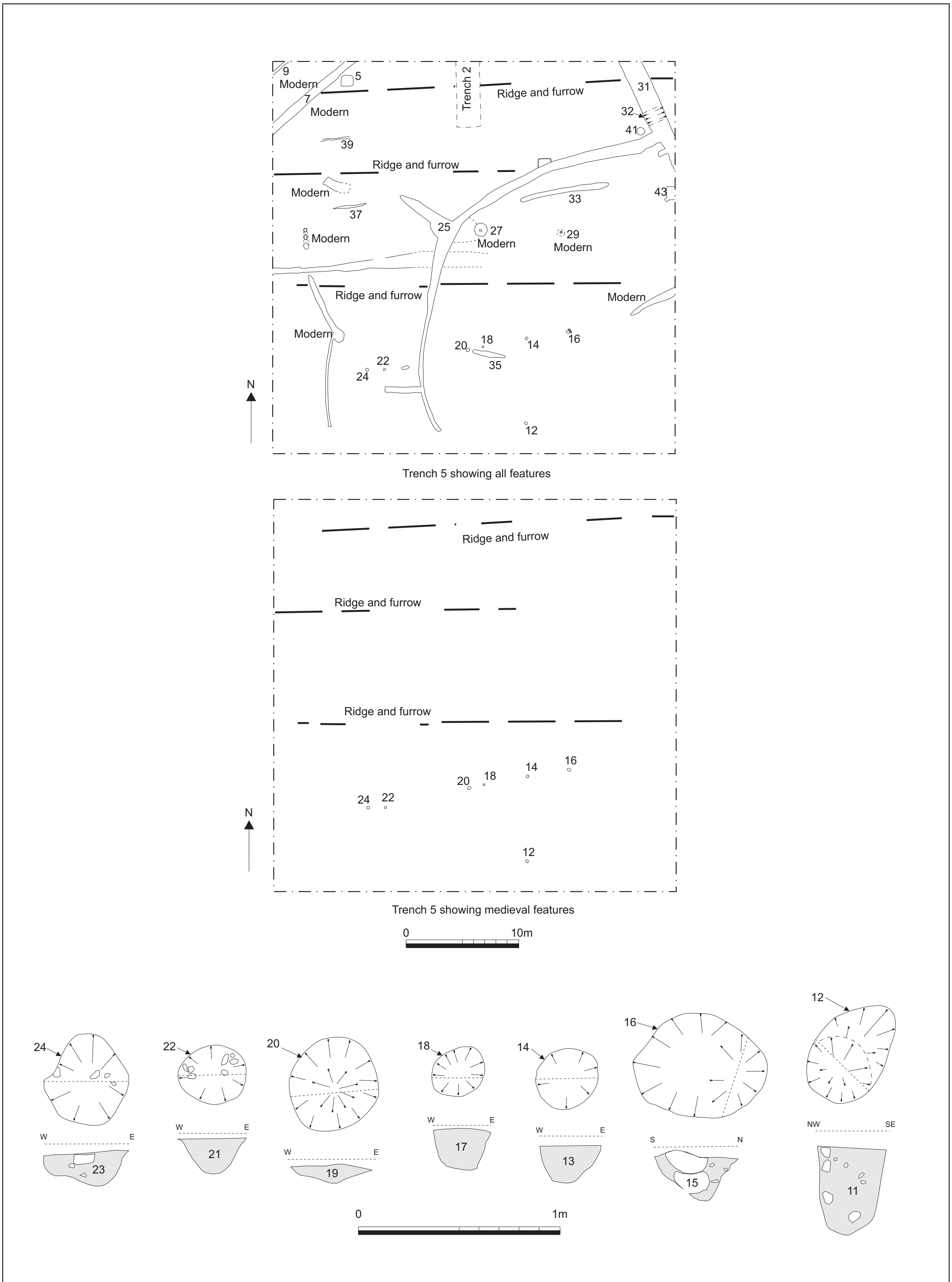


Fig. 5.60. Maelmin West Trench 5 plans and section drawings.

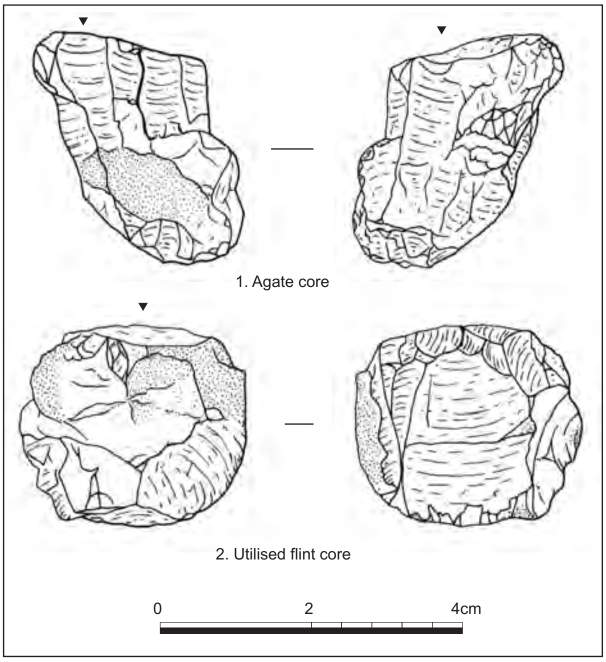


Fig. 5.61. Maelmin small finds.

palisade it appears that it was the river that ultimately defined the town and offered additional protection from the east. Another attraction of locating the town of Maelmin by the River Till may have been the opportunity to construct a mill where agricultural products could be processed. This may have been an important requisite of the food render laws associated with royal centres of *villa* or *urb* status (Alcock 1988, 27). Indeed the positioning of this royal centre by a river echoes the setting of Ad Gefrin where the Glen flows across the north flank of the site. The viability of establishing a mill along this stretch of the Till is to some extent confirmed by the siting of the more recent Heatherslaw corn mill 4km downriver near Etal.

In addition to the geographic arguments for the siting of Maelmin, the henges at Milfield South and Milfield North, on the west and north edges of Maelmin respectively, were still visible upstanding monuments at the time the town was occupied and were utilised during the early Anglian periods of the 6th to 7th centuries for pagan burials (Harding 1981; Scull and Harding 1990). It is not inconceivable, therefore, that the presence of the kinfolk and predecessors of the pioneer residents of Maelmin in the area around the new town was also an important factor in locating the royal estate there. Many of the early residents at Maelmin no doubt knew some of those buried in these monuments during their own lifetime and this tangible link with this part of the Milfield landscape may have served to legitimise the establishment of the estate centre there. Many of these new residents would have experienced the profound transition from pagan to Christian beliefs and this rebirth of their souls, combined with the new beginning of more strident Christian kingship under Oswald and Oswiu, may have played an important ideological role in bringing about the move to Maelmin. Indeed construction of this new centre may have served as both metaphor and realisation of a notion of a new Bernician 'Jerusalem' devoid of the ancient pagan baggage of Ad Gefrin. History shows that the zeal of the newly converted should never be underestimated and the opportunity to build one of the new centres for the newly reborn Christian kingdom of Bernicia may have been the short-term stimulus that prompted the actual abandonment of the ancient centre at Ad Gefrin and the move to Maelmin. This argument is thought to complement Cramp's view that this move represents a more settled society and secure hierarchy that no longer required a direct link to the old seat of power at Yeavering Bell (Cramp 1983, 275). Perhaps less prosaic, but of no less importance, was the demonstration of a break from the Deiran kingship of Edwin and his defeat by Cadwallon and the reinstatement of Aethelfrith's Bernician line as overlords of Northumbria.

It is perhaps the combination of these varied influences, rather than a single cause, that persuaded the Bernician elite to locate the new royal estate centre at Maelmin. It achieved a range of ends for a community that had experienced immense changes over a period of a generation or two in physical, political, and ideological/religious terms. Indeed it is Maelmin that has come down to us as the village of Milfield today and its continued importance as the central place for the basin bears testament to the astute understanding of landscape by the Bernicians. The bridging point across the Till still remains next to the site of Maelmin at Redscar Bridge whilst one of the main routes linking England and Scotland (the A697 trunk road) still passes through Milfield village on the west side of Maelmin.

Since the first aerial photographs of Maelmin taken in June 1948 by St. Joseph (Knowles and St. Joseph 1952: 270–1) and the recent detailed transcription of the aerial photograph cropmark data (Gates and O'Brien 1988) there has been no systematic investigation of the Maelmin site. Fieldwalking over part of the site took place as part of the Milfield Basin Archaeological Landscape Project (Waddington 1999), but this was concerned with the acquisition of Stone Age lithics. Although no pottery was recovered during the fieldwalking, a quern fragment of probable Anglo-Saxon type was retrieved. Together, the cropmark evidence and this evaluation demonstrate that structural features survive below both the arable and pasture areas covering the site, and that artefacts continue to be brought up into the ploughzone. The field at Maelmin West, unlike those containing the rest of the medieval township, is not regularly ploughed at the moment and is not contained within the constraint area of the scheduled ancient monument. The slight traces of a mound following the line of the double palisade can still be traced in this field, indicating that some upstanding archaeological features may survive in pockets where erosion has not been so intense. As a rare example of a royal township dating from the 7th to 8th centuries, the site at Maelmin needs to be managed with care as deep ploughing of this scheduled ancient monument for potatoes continues.

6 Managing the Historic Environment

David G. Passmore and Clive Waddington

INTRODUCTION

The north Northumberland landscape has regionally, nationally and internationally important archaeological remains, including major Mesolithic, Neolithic, Bronze Age, Iron Age and Anglo-Saxon sites and landscapes. It is exceptionally rich in prehistoric sites and features many hundreds of cropmark sites visible on aerial photographs (Chapter 4) as well as upstanding remains which are most common in the uplands. Protecting this important heritage is vital as it underpins the character, history and enjoyment of the region, as well as having a key role in academic research and public appreciation. The diverse geology and geomorphology of the region have given rise also to a wide range of distinctive landscapes and sedimentary sequences that constitute an archive of environmental change that extends over at least the past 20,000 years (Chapter 2). This palaeoenvironmental record contains evidence not only of the vegetation cover and physical landscape inhabited by past human groups, but also the impact of their land-use activities, whether this be woodland management, clearance or agriculture. Protecting and managing these archaeological and palaeoenvironmental resources requires accurate baseline information on the location, extent and form of sites and their landscape context, and also a clear understanding of the potential impacts and the practical needs of historic-environment managers, developers, landscape consultants and planning authorities. This chapter outlines a methodology initially developed for the Milfield Basin (Passmore *et al*. 2002), but which has since been adapted and applied to the wider Till-Tweed study area (Passmore *et al*. 2006). A practical historic environment guidance document with accompanying digital mapping for the Till-Tweed landscape (Waddington and Passmore 2005) has been produced for use by a wide range of stakeholders including the planning authority, developers (particularly the aggregate industry), planning and environmental consultants, English Heritage, English Nature, DEFRA and the academic community. This guidance document aims to provide a wide range of potential users with an explicit and comprehensive tool for managing the historic environment in north Northumberland.

The physical landscape of Northumberland reflects over 400 million years of geological history and was extensively modified by glaciers and meltwater associated with the advance and retreat of Late Devensian ice sheets between *c*.22,000 and 12,000 years ago. Further landscape changes have occurred during post-glacial times, in part due to the impact of human activities in the area. In the Till-Tweed region, these processes have combined to create a complex assemblage of landforms and sedimentary sequences that host archaeological and environmental remains dating to different periods. Thick sequences of sand and gravel deposited by downwasting ice sheets and meltwater during deglaciation of the region are particularly well developed in the study area's valley floors, and these presently form upstanding hummocky and terraced landscapes that are intensively farmed and quarried for their high-quality aggregate. Being fertile, free-draining, level and close to fresh water but free from flood risk, these areas have often formed important foci for settlement.

Neolithic groups built a wide range of ceremonial monuments and settlements on these easily tilled areas that are close to arterial rivers. These include the Milfield henge complex (Harding 1981) which shares many locational attributes with the other main henge sites in northern England, including the Thornborough complex in North Yorkshire (Thomas 1955; Harding 2000), the Ferrybridge henge in West Yorkshire (Roberts 2005) and the Penrith complex in Cumbria (Topping 1992). Anglo-Saxon remains are also frequently found on gravel terraces, with the Till and Tweed valleys boasting the royal townships of Ad Gefrin (Yeavering) (Hope-Taylor 1977), Maelmin (Gates and O'Brien 1988) and Sprouston (Smith 1991), as well as farming settlements such as Thirlings (O'Brien and Miket 1991), Lanton Quarry (Stafford 2007), Cheviot Quarry (Johnson and Waddington in press) and New Bewick (Gates and O'Brien 1988), pagan burials at Galewood (Keeney 1935), Milfield South henge (Scull and Harding 1990), Milfield North henge (Scull and Harding 1990) and industrial activity at Yeavering (Tinniswood and Harding 1991). In recent years a substantial number of Late Bronze Age/Iron Age enclosures and forts have been identified in lowland positions on the gravel terraces. The aerial photograph analysis conducted as part of this study (see Chapter 4) has shown numerous defended sites situated on these surfaces with a particularly striking pattern of strongly defended forts positioned along the lower Tweed on each side of the river. Given the intensity of multi-period remains on these surfaces, and that these areas are most at risk from aggregate extraction and other types of development, the sand and gravel deposits of the valley floors and their adjacent post-glacial river channel and floodplain environments have been mapped and analysed in the greatest detail. This is not to downplay the importance or sensitivity of archaeological landscapes developed in the Cheviot and Fell Sandstone uplands, but rather it acknowledges that the Till-Tweed valley floors face significantly more pressure from large-scale development.

METHODOLOGY

The goals of 'sustainable development', 'conservation' and 'partnership' are frequently articulated in contemporary planning and management discourse, but translating these ideals into practical initiatives is seldom easy. However, co-operation and consensus between developers, landscape planners, historic-environment managers and local authorities can be greatly facilitated by establishing a robust and accurate map-based database of archaeological and palaeoenvironmental resources. The Till-Tweed project has used this approach to produce explicit planning guidance for dealing with the historic environment (Waddington and Passmore 2005).

The basis for this historic environment planning guidance is a series of 1:10,000 maps covering the Till (including part of the Breamish) and lower Tweed valleys in Northumberland. The maps contain layers of information that show the following:

– The location of all sites and findspots in the Historic Environment Record;
– plots of all archaeological sites visible on air photographs, both upstanding and buried, to English Heritage's National Mapping Programme standard;
– the location of all fieldwalking findspots recorded in the study area;
– a complete classification of landforms and associated sedimentary sequences throughout the study area, including the delimitation of highly sensitive sand and gravel deposits and areas where organic-rich sediments of palaeoenvironmental value are liable to be preserved.

The data are compiled in a digital GIS database that can be readily updated to take account of new archaeological and palaeoenvironmental information, thereby ensuring the resource remains accurate and up to date.

Central to this methodology is the identification of 'landform elements' and their associated sedimentary sequences. Landform elements (*cf*. Stafford and Hajic 1992; Stafford 1995) are defined as discrete landform units having homogeneous geomorphological and topographical characteristics that can be defined on a variety of spatial scales; in the Till-Tweed study area these range from comparatively small features such as kettle holes or palaeochannels to much larger expanses of drift-mantled hillslopes and valley floors. Geoarchaeological investigations of this type have often demonstrated correspondence between particular types of landforms and their archaeological and palaeoecological associations (e.g. French and Wait 1988; Bettis 1992; Stafford and Hajic 1992; Passmore and Macklin 1997; Howard 2005), and can also address the potential of landscapes and their associated archaeology to experience modification, burial and/or transformation over time. The benefit of this approach thus lies in its ability to predict the potential age range and context of archaeology and palaeoenvironmental deposits lying on or beneath modern landsurfaces. From a heritage management perspective this has the advantage of establishing a robust and objective set of criteria for purposes of archaeological assessment, as well as providing a transparent rationale for the formulation of planning responses to proposed developments.

Table 6.1 outlines the range of landform elements that have been identified in the Till-Tweed study area together with their archaeological and palaeoenvironmental associations and a description of their geomorphological origin, age range and sedimentary characteristics. In Table 6.2 these landform elements are linked to a range of likely urban, infrastructure or agricultural activities that pose a potential threat to archaeological and palaeoenvironmental resources. This demonstrates that different categories of landform are subject to different kinds of development (e.g. house building on valley sides, drainage of the alluvial valley floor for agriculture, aggregate extraction on the sand and gravel terraces, mobile-phone masts on bedrock or drift-mantled hilltops, and power lines across a combination of landforms). The planning guidance approach may then be tuned to the geoarchaeological understanding of the landform context of any given development; Table 6.3 shows the staged evaluation sequence and recommended archaeological and palaeoenvironmental techniques for dealing with the type of remains specific to each landform element identified in the Till-Tweed study area.

The combination of landform element maps and the summaries of archaeological associations, planning guidelines and evaluation strategies set out in Tables 6.1, 6.2 and 6.3 allow landscapes with the highest archaeological sensitivity to be identified in advance of potential planning proposals by includ-

Landform element		Sediment type	Holocene geomorphic activity	Archaeological associations
1a	Bedrock with discontinuous shallow drift cover (Late Devensian)	Bedrock, till, some poorly-sorted slope deposits	Generally stable, some localised colluvial activity	Mixed age earthworks and artefacts at or within the soil surface, rock shelters, rock art on Fell Sandstones
1b	Undifferentiated Late Devensian glacial and glaciofluvial drift	Till, sand and gravel, some poorly-sorted slope deposits	Generally stable, some localised colluvial activity	Mixed age cropmarks, earthworks and artefacts. Can occur as upstanding features, features in underlying deposits or as artefacts in ploughsoils
1c	Late Devensian ice-contact meltwater deposits	Sand and gravel, some localised thin till deposits	Generally stable, some localised colluvial activity	Mixed age cropmarks, earthworks and artefacts. Can occur as upstanding features, features in underlying deposits or as artefacts in ploughsoils. Particularly common are Mesolithic flint scatters, Neolithic pits and ceremonial monuments and Early Bronze Age and Anglo-Saxon settlement sites
1d	Late Devensian glaciofluvial and glaciodeltaic terraces	Sand and gravel, some localised sand, silt and clay	Generally stable	Mixed age cropmarks, earthworks and artefacts. Can occur as upstanding features, features in underlying deposits or as artefacts in ploughsoils. Particularly common are Mesolithic flint scatters, Neolithic pits and ceremonial monuments and Early Bronze Age and Anglo-Saxon settlement sites
1e	Late Devensian and(or) Holocene palaeochannel deposits and enclosed basins inset within 1b, 1c and 1d	Sand and gravel, variable depth of fine sediment overburden	Generally stable, but possibility of local sediment accumulation	As (1b), but with potential for burial of late-glacial and Holocene landsurfaces, sediments and archaeological remains
1f	Late Devensian kettle holes inset within 1b, 1c and 1d	Peat, organic-rich and inorganic fine sediment	High probability for Lateglacial and Holocene sedimentation	As (1b), but with high probability for burial of Lateglacial and Holocene landsurfaces and(or) organic deposits
1g	Late Devensian glaciolacustrine deposits	Laminated sand, silt and clay	Landform stability over Holocene	Mixed age cropmarks, earthworks and artefacts. Can occur as upstanding features, features in underlying deposits or as artefacts in ploughsoils
1h	Late Devensian alluvial fans	Sand and gravel, some fine sediment	Landform stability over Holocene	Mixed age cropmarks, earthworks and artefacts. Can occur as upstanding features, features in underlying deposits or as artefacts in ploughsoils
2a	Holocene alluvial fans and colluvial spreads	Mainly sand silt and clay, some gravel	Possible Holocene alluviation / colluviation	Possible mixed age cropmarks, earthworks and artefacts, but high probability of buried *in-situ* landsurfaces, local reworking and truncation of older Holocene surfaces
2b	Holocene alluvial terraces and floodplain deposits (pre-nineteenth century)	Mainly sand and silt overlying sandy gravel	Alluviation and local fluvial erosion	Mixed age cropmarks (rare), earthworks (rare) and artefacts within ploughzone, high potential for buried Holocene landsurfaces and organic deposits, local reworking and truncation of older Holocene surfaces
2c	Holocene alluvial palaeochannels and floodbasins developed on 2b surfaces	Alluvial sand, silt and clay with variable organic content, peat	Alluviation and local fluvial erosion	Limited or no surface archaeology, but proven (or high probability of) buried *in-situ* landsurfaces and organic deposits
2d	Nineteenth century and later river channel and floodplain deposits; modern channel and floodplain environments	Mainly sand and silt overlying sandy gravel	Alluviation and local fluvial erosion	No intact pre-19th C. archaeology on or beneath surface
2e	Holocene peat bogs / mires	Peat, some less-organic inwash	Accumulation of peat and organic-rich deposits	Limited or no surface archaeology, but proven (or high probability of) buried *in-situ* landsurfaces and organic deposits
3	Modern ponds / reservoirs and quarry workings	n/a		Archaeological material in secondary (reworked) contexts only where disturbed by quarrying.

Table 6.1. Landform, sediment and archaeological associations for the Till-Tweed catchment (modified after Passmore et al. *2002).*

	Impact	Lateglacial / early Holocene landform elements				Holocene landform elements				
		1a–d	1e–h	1f	1g	2a	2b	2c, e	2d	3
1	Sand and gravel extraction	✓	✓	✓		✓				✓
2	Cable and pipe trenching	✓	✓	✓	✓	✓	✓	✓		
3	Pylons	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Ploughing (especially deep)	✓	✓		✓	✓	✓			
5	Field Rationalisation	✓	✓		✓	✓	✓			
6	Construction	✓	✓		✓	✓	✓			✓
7	Drainage works (lowering of water tables)		✓	✓			✓	✓		
8	Wind farms	✓ 1a–b								✓

Table 6.2. Development threats to archaeological and palaeoenvironmental resources in Till-Tweed landform elements.

ing this information into local development plans. This approach also allows areas that are currently free of any documented archaeological remains to be considered in terms of their *potential* for such remains to be encountered. Strategic planning that seeks to minimise impacts on the historic environment from an early stage not only assists with long-term landscape conservation but also reduces the costs to developers. Combining good conservation practice with cost-effective development will contribute to achieving the mutual goals of sustainable development and a competitive economy. When carefully planned, development can produce positive impacts on the historic environment by providing opportunities to progress research, make academic breakthroughs, train students and professionals, develop techniques, improve understanding on how best to conserve fragile deposits, and to deliver improved public access, participation and interpretation, thereby adding to quality of life.

LANDFORM ELEMENTS AND ARCHAEOLOGICAL ASSOCIATIONS

In the following sections we outline the broad range of archaeological and palaeoenvironmental associations specific to each of the classified landform elements in the Till-Tweed study area. These are compiled from the results of palaeoenvironmental work detailed in Chapter 2, and from analysis of archaeological field-walking (Chapter 3), aerial photographs (Chapter 4), evaluation trenching (Chapter 5) and the wider literature. Overviews provided here are geared towards informing archaeological management and evaluation and are augmented by a series of detailed case studies for specific parts of the study area in Chapter 7. The following discussion is not intended as a comprehensive synthesis of the landscape through time as this forms the subject of a forthcoming companion volume (Passmore and Waddington in prep.).

Category 1a: Bedrock with discontinuous shallow drift cover (Late Devensian)

Outcropping bedrock with a localised shallow drift cover characterises hilltop and hillslope environments through much of the Cheviot Hills and Fell Sandstones flanking the Breamish/Till valley (Figs 2.7; 6.1). These landscapes constitute 145km^2 (26%; Table 2.2) of the mapped study area and have the potential to contain both upstanding and buried archaeological deposits of all periods. Typical examples of upstanding archaeology on these landforms include prehistoric cairns (e.g. Jobey 1968; Gates 1982; Hewitt and Beckensall 1998), Bronze Age settlements and field systems (e.g. Jobey 1983a; 1985; Gates 1983; Burgess 1984) and Iron Age hillforts, palisades, enclosures, field systems and cultivation ridges (e.g. Jobey 1965; 1983b; Topping 1989; 2004; Smith 1990; Waddington *et al.* 1998; Frodsham and Waddington 2004). Also prominent on the Fell Sandstone escarpments are prehistoric rock carvings (Fig. 6.2) (e.g. Beckensall 2001; Waddington 1998; Waddington *et al.* 2005) and the remains of post-medieval coal mining activity, while outcropping or near-surface bedrock has provided solid foundations for the medieval castles at Etal, Ford and Norham. Archaeology may also lie buried beneath a shallow soil cover, including prehistoric pits and postholes (see Burgess 1984), Bronze Age cist burials (e.g. Short 1931; Topping 2004), Iron Age scooped house platforms on sloping ground (e.g. Frodsham and Waddington 2004), ancient road/track surfaces (e.g. Topping 2004) and features associated with Mesolithic rock shelters (Fig. 6.3) (e.g. Burgess 1972; Beckensall 1976; Waddington 1999b). There is also the potential for 'axe factory' sites on the andesite outcrops of the north-west Cheviot massif (e.g. Waddington and Schofield 1999).

Category 1b: Undifferentiated Late Devensian glacial and glaciofluvial drift

Undifferentiated Late Devensian glacial and glaciofluvial drift accounts for 217km^2 (39%; Table 2.2)

Stage	Evaluation Sequence	Lateglacial / early Holocene landform elements					Holocene landform elements					
		1a–d	1e	1f	1g	1h	2a	2b	2c	2d	2e	3
Stage 1	**Consultation** undertaken with Local Authority archaeologist and /or consultant resulting in an agreed scheme of work											
Stage 2	**Desk-Based Assessment** of Till Tweed GIS database and additional records (*e.g.* SMR, NMR & early maps where appropriate) to identify recorded archaeology and landform element classification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stage 3	**Pre-Determination Evaluation** for example:											
	(i) *Aerial Photography*	✓	✓	✓		✓		✓	✓			
	(ii) *Fieldwalking and/or Test Pits*	✓			✓	✓	✓	✓			✓	
	(iii) Geophysical Survey for both archaeological and palaeoenvironmental remains (*e.g.* resistivity, magnetometer, ground penetrating radar *etc.*)				✓	✓	✓	✓	✓			
	(iv) *Evaluation Trenching*	✓	✓		✓	✓	✓	✓			✓	
	(v) *Geoarchaeological Evaluation* (such as landform mapping and hydrological survey)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	(vi) *Sediment Analysis* (*e.g.* quarry faces and river bank sections, but may require machine excavation / test pitting / sediment coring)		✓	✓	✓	✓	✓	✓	✓		✓	
Stage 4	**Planning Decision**											
Stage 5	**Archaeological and Palaeoenvironmental Recording** This stage may not be necessary depending on the outcomes of Stage 3. Potential actions as follows:											
	(i) *Watching Brief*	✓			✓	✓	✓	✓			✓	
	(ii) *Excavation*	✓			✓	✓	✓	✓			✓	
	(iii) *Archaeological Survey*	✓			✓	✓	✓	✓		✓		
	(iv) *Palaeoenvironmental Analysis* (*e.g.* pollen, plant macrofossils, insects *etc.* from organic-rich sedimentary sequences including buried soils)	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Stage 6	**Post-excavation, Analysis and Dating**	All data is collected from previous stages and is fully analysed and documented										
Stage 7	**Archiving, Dissemination and Publication**	All data from previous stages is archived and a dissemination strategy adopted										

Table 6.3. Staged responses and recommended archaeological and palaeoenvironmental evaluation techniques for Till-Tweed landform elements.

Fig. 6.1. View of the Fell Sandstone escarpment (landform element Category 1a) at Old Bewick hillfort in the Breamish valley; note exposed bedrock and WW2 pillbox.

Fig. 6.2. View of the single largest rock art panel in England at Roughting Lynn where it occurs on an outcrop of Fell Sandstone (landform element Category 1a).

Fig. 6.3. A rock shelter site at Goatscrag where Mesolithic struck flints have been discovered.

of the study area. These landscapes generally lie at intermediate elevations between the bedrock and shallow drift of the fringing uplands (Category 1a) and the valley floor deposits of meltwater-derived sand and gravel (Categories 1c and 1d). Undifferentiated drift covers 85km^2 of the Tweed study block where it forms undulating, drumlinised terrain that borders the inset river valley (Fig. 6.4). Sedimentary associations include till, solifluction deposits, localised deposits of glaciofluvial sand and gravel and some colluvial slope deposits. Holocene colluviation on lower hillslope facets may have led to localised shallow burial of older landsurfaces, but in general these landform elements have seen little post-glacial geomorphic activity and have low potential for preserving naturally occurring organic-rich sedimentary sequences.

Archaeological remains typically associated with these areas include a variable density of Mesolithic-Neolithic lithic scatters. Comparatively few stone tools are found on poorly-drained clayey drift mantling the lower valley slopes to the east of the River Till, while the highest densities occur on drift deposits associated with the drumlinised landscapes of the lower Tweed and hillslopes of the Cheviots and the Fell Sandstone escarpment (see Chapter 3). Only a few upstanding sites belonging to the Neolithic period are known to occur on undifferentiated drift, of which the stone circle at Duddo, on the crest of a low drumlin, is perhaps the most impressive (Fig. 6.5). However, from later prehistory onwards these landforms appear to have been more intensively settled and farmed, as evidenced by the large numbers of late prehistoric enclosures that include palisaded sites such as Fenton Hill (Burgess 1984), Fawdon Dene (Fig. 4.29; Frodsham and Waddington 2004) and the sites at Threecorner Wood and Hetton Hall (see Chapter 5), and rectilinear enclosures such as those at St Cuthbert's Farm (Fig. 3.16) and the site at Flodden Hill (see Chapter 5). These sites typically lie within land that has been ploughed and cultivated, yet in all cases stratified and in some cases upstanding remains are well preserved. They also have the potential for excellent preservation of archaeological and palaeoenvironmental deposits; for example, the Fawdon Dene enclosures (Fig. 6.6) preserved the remains of unburnt bone of Late Iron Age date – a rare occurrence in northern England – whilst the primary ditch fill of the Flodden Hill enclosure comprised fully waterlogged organic-rich sediment that has provided extremely detailed insights into the contemporary landscape around the site, the type of farming activities taking place as well as climatic indicators.

Furthermore, cropmarks generally form well on these landforms and provide a rich source of information

Fig. 6.4. Drumlinised landscape (landform element Category1b) near Norham, lower Tweed valley.

Fig. 6.5. The impressive remains of the Duddo stone circle that sits astride the crest of a low drumlin (landform element Category 1b).

Fig. 6.6. Excavation in progress on the intersection of the two Fawdon Dene enclosures. The stone in the foreground was the tumbled remains of a stone-built Iron Age roundhouse that preserved the remains of unburnt animal bone within the buried deposits. Being constructed on andesitic drift material, this igneous base-rich rock produces a sufficiently non-acidic environment in which organic materials such as bone can survive.

for planning purposes. The hummocky, drumlinised landscape of the lower Tweed valley reveals a distinct association with palisaded enclosures that can frequently be found sited on the crest of drumlins, where such positions afford dry ground, wide views and a defendable position. Other archaeological associations include pit alignments such as that at Clavering (Miket 1981; 1987), Roman temporary camps such as that at East Learmouth (Chapter 4) and much of the line of the Roman road known as the Devil's Causeway, as well as occasional rock carvings found on erratics and earthfast boulders set within till deposits. Elsewhere in Northumberland extensive areas of Iron Age and Romano-British settlement have been found on landscapes of undifferentiated drift in the form of roundhouses, enclosures and pit alignments at sites such as Pegswood, Newcastle Great Park and East Brunton. Numerous examples of deserted medieval villages, often with well-preserved remains of house platforms, roads and ridge and furrow cultivation testify to the continued utilisation of these landscapes into the medieval period.

Categories 1c and 1d: Late Devensian ice-contact meltwater deposits (1c) and Late Devensian glaciofluvial and glaciodeltaic terraces (1d)

Thick sequences of sand and gravel deposited by ice contact meltwater (Category 1c) and as glaciofluvial and glaciodeltaic outwash terraces (Category 1d) together account for some 131km^2 (nearly 23%, Table 2.2; Fig. 2.11) of the study area. They form generally free-draining and fertile landscapes that overlook adjacent Holocene river channel and floodplain environments and exhibit a wide range of relief. Hummocky ice-contact meltwater landscapes in the valley of the River Till between New Bewick and Wooler, for example, are preserved at elevations between 275–50m OD (Fig. 6.7). Glaciofluvial terraces tend to be developed at lower elevations and are generally characterised by gently sloping, low-relief surfaces. In some parts of the study area, notably in the eastern and southern parts of the Milfield Basin, the surface elevation of the lowest and youngest glaciofluvial terraces may sit only 1–2m above the present floodplain and their distal margins are locally overlapped by Holocene alluvial sediments.

Together these landform elements constitute some of the most archaeologically sensitive landscapes to be identified in the county. Few upstanding remains survive on these surfaces as they have usually been subjected to prolonged ploughing over many centuries. However, they provide the highest densities of lithic artefact scatters in the study area (see Chapter 3). These assemblages date primarily to the Mesolithic and Neolithic periods and testify to the attraction of these landforms to hunter-gatherer and early farming groups. Close-spaced fieldwalking has been demonstrated to be particularly effective in locating areas of Mesolithic and Neolithic activity and identifying areas where buried remains survive (see Chapter 7). Furthermore, fieldwalking these landforms in advance of development constitutes a rapid and relatively inexpensive means of recording the archaeological resource of the ploughsoil before its removal.

Late Devensian sand and gravel deposits are particularly conducive to cropmark development and host large numbers of cropmark sites ranging in date from the Neolithic through to the present. Important Neolithic sites of various types have been recorded on these surfaces, including settlements (Miket 1987; Waddington 2006; Johnson and Waddington in press), henges (Harding 1981; see Chapter 5), standing stones (Waddington 1999), pit alignments (Miket 1981; Harding 1981; see Chapters 4 and 5), mortuary enclosures (Miket 1976; Chapter 4) and burial sites (Miket 1985),

Fig. 6.7. Ice-contact (kamiform) meltwater deposits (landform element Category 1c) in the Breamish/Till valley near Roseden.

while further evidence of extensive Neolithic activity is now emerging as a result of large-scale surface stripping in advance of aggregate extraction at the Cheviot and Lanton Quarries near Milfield (Fig. 6.8). The Neolithic pits at the Coupland enclosure (see Chapter 5) have proved of particular significance in providing some of the earliest dates for the Neolithic in the British Isles. This evaluation has also shown that monuments that are revealed as cropmarks can have a much more protracted history than they might first suggest; the Coupland site has provided evidence for activity spanning a 2000 year period, although this may not necessarily have been continuous. Furthermore, these Neolithic sites frequently preserve evidence for the structural form of buildings and monuments as well as abundant ceramic evidence (Fig. 6.9) that can yield additional information from the analysis of surviving residues (Johnson and Waddington in press). Bronze Age remains are also a feature of these surfaces in the form of ring ditches (Miket 1985 and see also Chapter 3) and unenclosed roundhouse settlements (Fig. 6.10) (Stafford 2007; Johnson and Waddington in press), while an Iron Age presence is represented by a wide variety of enclosure sites (see Chapter 4) as well as multivallate lowland forts and land boundaries. Roman period sites include the temporary camp at Horton and the fortlet guarding the crossing of the River Tweed at Groathaugh (see Chapter 4).

Some of the most important remains found associated with these landforms are the towns and settlements of early medieval Northumbria including the royal sites of Ad Gefrin (Hope-Taylor, 1977) and Maelmin (Gates and O'Brien 1988; Chapter 5), as well as the settlements at Cheviot Quarry (Fig. 6.11) (Johnson and Waddington in press), Thirlings (O'Brien and Miket 1991), New Bewick (Gates and O'Brien 1988) and Lanton Quarry (Fig. 6.12; Stafford 2007). Anglo-Saxon burial sites are also known on these landforms and have been found at Galewood (Keeney 1935) and as later additions to the henge monuments at Milfield North and Milfield South (Scull and Harding 1990). Together these sites have provided some of the most important evidence for early Anglo-Saxon building forms and constructional techniques in Britain. Furthermore, archaeobotanical residues surviving on these sites can promote our understanding of farming practices, as was attested by the Maelmin West evaluation (see Chapter 5) and the excavations at Thirlings (O'Brien and Miket 1991).

Although soils developed on sand and gravel deposits may readily permit cropmark formation, the visibility of archaeological features can be poor once the topsoil is stripped away. This is especially the case for features with sandy or gravelly fills. Recent experience gained through undertaking evaluations (see Chapter 5) and large-scale surface strips at the Cheviot and Lanton Quarries has demonstrated that differential drying of the sand and gravel surface and associated archaeological features renders the latter most visible after two or three weeks of exposure. Thereafter, however, such features can lose their definition again as the surface further dries out and

Fig. 6.8. The remains of a triangular arrangement of postholes of an Early Neolithic building at Lanton Quarry that produced domestic pottery from its central hearth pits and postholes. Scales = 2m.

Fig. 6.9. Early Neolithic carinated bowl pottery being excavated from a pit containing domestic midden material during excavations at Cheviot Quarry. Scale = 0.1m.

Fig. 6.10. A circular Late Bronze Age house with internal hearth and storage pits and porch with double postholes at the entrance (foreground) after excavation at Cheviot Quarry. Scales = 2m.

Fig. 6.11. One of three late 5th – early 6th century AD buildings excavated at Cheviot Quarry on the sand and gravel terraces (Landform Categories 1c and d), although the two largest pits in the foreground belonged to an earlier phase of Late Neolithic activity. The quarry processing plant can be seen in the middle ground with the distinctive round-topped Cheviot Hills in the background. Scales = 2m.

Fig. 6.12. Part of the Anglo-Saxon settlement and industrial complex excavated at Lanton Quarry showing three Grubenhäuser on the left of the picture and two post-built buildings in the centre ground all located on landform element Category 1c. Yeavering Bell is the dome-shaped hill in the background at the entrance to Glendale. Scales = 2m.

acquires a consistent colour. The acidic environment of sand and gravel deposits in the study area also limits the potential for study of human and animal bone assemblages; unless burnt, bone of Romano-British or earlier age is unlikely to survive in these contexts.

Category 1e and 1f: Late Devensian and(or) Holocene palaeochannel deposits and enclosed basins (1e) and Late Devensian kettle holes (1f)

Landscapes associated with ice-contact meltwater deposits (Category 1c), glaciofluvial and glaciodeltaic terraces (Category 1d) and, to a lesser extent, undifferentiated drift (Category 1b) locally feature palaeochannels and enclosed basins (Category 1e) and smaller kettle holes (Category 1f) that also have their origins during regional deglaciation (Fig. 2.11). These localised depressions and channels account for a comparatively small proportion of the mapped study area at less than 7 km^2 (1%) and 1 km^2 (0.1%; Table 2.2) respectively, but have been differentiated in the landform classification on the basis that these features can act as long-term sediment traps in the landscape. Kettle holes (Category 1f) in particular have been to shown to support small lake and wetland habitats that have persisted throughout the Holocene (Jones *et al.* 2000; Fig. 6.13), and locally these features are likely to have formed an important element in landscapes of resource procurement and livestock management (see Chapter 7). At New Bewick, for example, a small concentration of Mesolithic lithics were noted around an infilled kettle hole (see Chapter 3 and Chapter 7) indicating the attraction of these areas of standing water for past human groups. At another nearby kettle hole the aerial photographs reveal a system of land boundaries probably associated with stock control and giving access to the standing water in the kettle hole (Fig. 3.7). In this case the kettle hole itself seems to have been integrated into the land-use system as a watering place for stock.

Organic-rich sedimentary sequences preserved in these settings may contain long-term palaeoenvironmental records specific to the locality (Jones *et al*. 2000) and, as they occur within the settlement foci of the landscape, these sites are ideally located to provide insights into past land use and farming practices that are unlikely to be obtained from upland mires. They also have the potential to contain organic remains and other archaeological residues that are often absent or poorly preserved on most other archaeological sites. Accordingly, and despite the paucity of recorded archaeological features developed in these settings, these landform elements are highly sensitive from a heritage management perspective.

Category 1e palaeochannels and enclosed basins

Fig. 6.13. Kettle hole (landform element Category 1f) developed in ice-contact meltwater deposits near Roseden, Breamish/Till valley.

also present potential Holocene sediment traps and in some localities appear to support poorly drained soils and wetlands. At present, however, there is no information on the depth and character of sedimentary sequences infilling these depressions.

Category 1g: Late Devensian glaciolacustrine deposits

Late Devensian glaciolacustrine sands, silts and clays lie close to the landsurface to form low-relief terraces overlooking the Holocene valley floor in the Breamish valley near Beanley, and on the eastern side of the Milfield Basin near Doddington. They constitute some 3km^2 (less than 1%; Table 2.2; Fig. 2.11) of the total mapped study area. In contrast to meltwater-derived sands and gravels in the valley floor, these fine sediments tend to be associated with poorly drained, heavy clay soils. The age of these landforms suggests they have the potential to host archaeology spanning the entire Holocene period, and occasional lithic findspots on their surfaces testify to the local activities of prehistoric people. Ridge and furrow field systems of medieval or later date are also developed on the terrace surfaces. However, and notwithstanding the relatively poor prospect for cropmark detection here, there is little evidence to suggest that these parts of the landscape were significant locations for settlement and agriculture during prehistory.

Category 1h and 2a: Late Devensian alluvial fans (1h) and Holocene alluvial fans and colluvial spreads (2a)

Late Devensian and Holocene alluvial fans are locally developed at the mouth of tributary streams and dry valley side gullies where they form only a small proportion (collectively 1.4km^2; 0.26%) of the Till-Tweed landscape (Figs 2.11 and 2.19; Table 2.2). In the absence of river bank or other exposure of these landforms there has been no attempt in this study to investigate their sedimentary sequences or dating controls, and the present age differentiation is based solely on morphostratigraphic relationships (see Chapter 2). Alluvial fans have the potential to bury former landsurfaces and associated archaeology and palaeoenvironmental material that predate the period of fan formation. The possibility of Late Devensian landsurfaces lying sealed and intact beneath a protective cover of fan sediment is perhaps small, but as Palaeolithic human activity has not yet been unequivocally demonstrated in this part of Northumberland it is considered that any opportunity to evaluate these landforms is important.

Holocene colluvial deposits have not been delimited or subject to systematic investigation in this project and hence are not quantified as a component of the study area landsurface. Nevertheless it is important to recognise the potential for slope facets to have experienced colluvial processes, especially during and after the onset of woodland clearance and agricultural activity in the region. Colluvial processes not only have the potential to displace artefacts both downslope and within the soil profile, but may also bury former landsurfaces beneath protective veneers of slopewash.

Category 2b: Pre 19th C. Holocene alluvial terraces and floodplain surfaces

Holocene alluvial terraces and floodplains constitute a relatively small proportion (nearly 36km^2; 6%; Table 2.2; Figs 2.19 and 6.5) of the mapped study area, but frequently lie close to major archaeological assemblages and will have played an important role in many aspects of prehistoric and historic land use in the Till-Tweed valleys. River channel and floodplain environments constitute the lowest elevation components of the valley landscape and lie inset below glaciodeltaic and glaciofluvial terraces (Fig. 6.14), but in contrast to these Late Devensian landsurfaces they have been subject to varying degrees of post-glacial geomorphological activity. In common with many documented river valleys elsewhere in northern Britain (e.g. Tipping 1994c; 1995; 1996; Passmore and Macklin 1997; 2000; Howard and Macklin 1999; Chiverrell *et al*. 2007), the combination of long-term river channel changes and floodplain alluviation in these settings has created a complex mosaic of fluvial terraces and palaeochannels (Category 2c, see below) that date to different periods of the Holocene, and any associated archaeological features and materials may have experienced local erosion, reworking and/or burial.

In relatively wide reaches of the Holocene valley floor, notably in the River Breamish upstream of Beanley, the River Till in the Milfield Basin and in the lower Tweed at Coldstream, parts of the main fluvial terrace date from early prehistoric times and have escaped later Holocene channel erosion. These areas have the potential to host archaeological remains from the Mesolithic to the present, and fieldwalking across prehistoric terraces at Coldstream (see Chapter 7) has shown that they can contain relatively high lithic counts that are comparable to some areas of the upstanding Late Devensian sands and gravels. In valley floor localities elsewhere in the study area, by contrast, the high proportion of palaeochannels dating to the post-Roman period indicates that a significant expanse of the river environment has been reworked to some extent by later Holocene fluvial activity. It is perhaps not surprising that these younger surfaces have yielded little archaeological material except for

Fig. 6.14. Holocene alluvial terrace (landform element Category 2b) inset below glaciofluvial terrace (left) (landform element Category 1d) in the lower Tweed valley near West Newbiggin.

medieval and later field systems. However, in these areas, as well as the pre-Roman localities, there remains the possibility of former landsurfaces and organic-rich deposits surviving concealed below a variable depth of fine-grained alluvium. Documented alluvial sequences in the Milfield Basin, for example, clearly demonstrate the widespread burial of Late Glacial and early-mid Holocene floodplains at depths between 2–5m (see Chapter 2). Accordingly, assessment of archaeological potential is likely to require deep evaluation coring or trenching as features are unlikely to show as cropmarks or be receptive to geophysical survey.

Category 2c: Holocene alluvial palaeochannels and floodbasins with proven (or high potential for) organic-rich deposits

Palaeochannels, and to a lesser extent floodbasins, are characteristic features of alluvial surfaces throughout the Till-Tweed study area and are particularly well-developed in wider parts of the Holocene valley floor (Figs 2.19 and 6.15). In combination these landform elements constitute less than 2km^2 (less than 1%; Table 2.2) of the total mapped landsurface area, but by acting as long-term sediment traps for organic-rich deposits they form a potentially important archaeological and palaeoenvironmental resource. Geoarchaeological investigations in Holocene alluvial contexts elsewhere in Britain have demonstrated, for example, that a wide range of riverine features and artefacts including bridge structures, fish weirs and traps, boats and votive offerings may be exceptionally well preserved in palaeochannel deposits (e.g. Parker and Robinson 2003; Cooper 2003; Howard 2005). Palaeochannel and floodbasin sedimentary sequences in the Till-Tweed study area have been shown to preserve organic-rich and peaty deposits up to a maximum recorded thickness of *c*.4–5m, although they more typically range between 2–3m (see Chapter 2). Available radiocarbon chronologies indicate that palaeochannel and floodbasin fills in the Powburn-Beanley reach of the river Breamish and in parts of the Milfield Basin locally date to the early-mid Holocene. In general, however, recorded channel fill deposits typically date to later prehistoric through to early post-medieval times.

Archaeological investigation of Holocene palaeochannel and floodbasin deposits has yet to be undertaken in the Till-Tweed study area and hence the preservation of archaeological materials in these contexts remains no more than a theoretical possibility. This study has, however, confirmed that palaeoenvironmental analysis of organic-rich alluvium offers the opportunity to investigate floral and

Fig. 6.15. Holocene palaeochannel depression on the valley floor of the river Breamish near Bewick Bridge.

faunal assemblages contemporary with evidence of prehistoric and historic human land use activity in many parts of the valley floor. These results build on previous work in the Breamish/Till valley (Clapperton *et al*. 1971; Borek 1975; Tipping 1992; 1994a; 1998) and are consistent with the findings of geoarchaeological studies elsewhere in British river valleys (e.g. Brown 1997; Moores *et al.* 1999; Fyfe *et al*. 2003). Of particular note here is the propensity of Holocene channel fills in the Till and Tweed valleys to contain records of prehistoric and historic woodland management and subsistence activity, including cereal production, in the immediate vicinity of settlement foci. Chapter 2 provides an overview of palaeovegetation records from channel fill deposits in the study area, and some examples of their correspondence with nearby archaeological records are detailed in the case studies presented in Chapter 7.

Category 2d: 19th Century and later alluvial terraces and palaeochannels

Some 10 km^2 (nearly 2%) of the landsurface in the study blocks is occupied by fluvial terraces that post-date the mid-19th century and the modern river channel and adjacent floodplains (Fig. 2.19). These parts of the landscape are frequently delimited by nineteenth-century flood embankments, and their formation has been associated with limited incision and reworking of the local valley floor. While these areas may contain information relevant to aspects of recent history, these landform components of the valley floor are considered to be of very low archaeological sensitivity.

Category 2e: Holocene peat bogs/mires

Holocene peat bog and mire deposits account for less than 4 km^2 (less than 1%; Table 2.2) of the land cover in the study area and typically occur as small patches between drumlin mounds or in small depressions within the Fell Sandstone uplands. Many of these areas have been affected by forest plantations and/or modern drainage works, and hence are liable to have been modified by surface cutting and lowering of water tables. To date, however, there have been no published investigations of the depth, character or age of their sedimentary sequences within the Till-Tweed study area, although as these deposits form by accumulation they have the potential to conceal and bury archaeological remains, as has been demonstrated in the case of late prehistoric boundaries along the line of Hadrian's Wall (Jim Crow pers comm). Peat bogs provide excellent anaerobic preservation environments for both organic and non-organic materials and therefore any archaeological site found in such a landform is likely to be exceptionally well preserved. Although no systematic archaeological assessments or excavations have taken place on peat deposits in the study area, internationally important sites such as Star Carr in North Yorkshire (Clark 1971) demonstrate the potential for excellent preservation even in the case of very early Holocene sites. In addition to their archaeological potential these deposits also have a well-recognised potential to yield vegetation histories through a variety of palaeoecological analyses. Young (2004) has recently reviewed pollen records of Holocene environments and human activity from a variety of upland peats in the area of the Northumberland National Park, while analysis of a peat core from Ford Moss (NT96923764) will be reported in the forthcoming companion volume (Passmore and Waddington in prep.).

Category 3: Modern ponds/reservoirs and quarry workings

Case studies of the Lanton and Cheviot quarries, developed on glaciodeltaic sand and gravel deposits in the Milfield Basin (Fig. 2.11), illustrate the considerable wealth of archaeological material that can be anticipated in those parts of the landscape that are subject to aggregate extraction (see Chapter 7). Elsewhere in the landscape, several small ponds and reservoirs in the study area are also of man-made origin or have been extensively modified, although some hilltop examples such as Coldmartin Lough, near Wooler (Fig. 6.16), may have escaped disturbance and potentially contain sedimentary records of palaeoenvironmental value. Other modern man-made landforms and disturbed ground in urban areas and the wider built environment are unlikely to contain archaeological deposits, other than modern material that may be considered archaeology to future generations and residual material brought in from elsewhere. However, such ground may overlie relatively undisturbed ground that has the potential to host archaeological deposits. If this is suspected then evaluation of such ground should include an appropriate strategy for assessing the buried landform.

APPLYING THE LANDFORM ELEMENT APPROACH

Landform elements defined in this study present contrasting scenarios for the preservation and evaluation of archaeological and palaeoecological deposits, and also determine the level to which such resources are impacted upon by modern land use (Tables 6.1, 6.2 and 6.3). Activities particularly relevant to the Till-Tweed area include sand and gravel extraction, agricultural ploughing (especially deep-ploughing), cabling and pipe trenching, land drainage, field rationalisation and building works (including housing, transport and industrial development).

Fig. 6.16. View from a cup and ring marked rock to Coldmartin Lough, an upland wetland on the Fell Sandstone escarpment. Sediment traps such as this provide the potential to undertake detailed environmental reconstruction in the immediate environs of carved rock surfaces.

Archaeological material and features surviving at or immediately below the modern ground surface of any landform elements are particularly vulnerable to activities that disturb soil and sediment profiles within and below the ploughzone. Of particular concern is aggregate extraction that for many years has exploited the extensive sand and gravel deposits of ice-contact meltwater deposits and spreads of glaciofluvial and glaciodeltaic outwash (Categories 1c and 1d) in the Till-Tweed valleys. Any expansion of these practices will clearly impact upon the widespread multi-period archaeology that survives on these terrace complexes. However, less well documented are threats associated with modern agricultural ploughing regimes, and especially deep-ploughing associated with some root and vegetable crops (Passmore *et al*. 1998; Waddington 1999). These practices constitute a potential threat across all landform elements of Late Devensian origin, and it is perhaps ironic that thinly developed soils that have yielded well-developed cropmark records on the extensive sand and gravel landscapes of the area offer little protection to the archaeological resource from these high-impact agricultural practices.

For Holocene river valley floor and colluvial landform elements (Categories 2a–c), the likelihood of disturbing *in situ* archaeological contexts within upper levels of soil and sediment sequences will be related to the age and depositional history of specific landform units. Most of the fluvial terrace surfaces and their associated palaeochannels and flood basins throughout the Breamish, Till and lower Tweed valleys may be considered sensitive in this respect. However, multi-period archaeological assemblages with a prehistoric component will be restricted to the older parts of the fluvial landscape and may be absent in narrower reaches of the valley floor which have experienced widespread reworking during the later Holocene.

Despite widespread field drainage improvements over meltwater-derived sand and gravel terraces, the upper parts of their sedimentary sequences are generally located well above local water tables and hence land drainage improvements pose only a limited threat to archaeological and/or palaeoenvironmental remains on these landforms. However, inset palaeochannels, depressions and especially kettle hole deposits (Categories 1e and f) are typically subject to permanent or seasonal waterlogging, and land drainage improvements in these contexts may therefore promote degradation of archaeological and palaeoenvironmental records contained in their organic-rich deposits. On the river valley floor all alluvial fills (Categories 2b and 2c) in the study area have the potential to contain buried organic-rich channel fills, floodbasin sediments and floodplain soils with well-preserved archaeological (especially organic) materials and palaeoenvironmental evidence of Holocene vegetation and land use changes. Post-war land drainage activity on the valley floor will have undoubtedly reduced local floodplain and terrace water tables and promoted degradation of organic sediments and material in the upper levels of these deposits. Alluvium lying at depths between 0.5 and 1m below terrace surfaces appears, however, to survive in a sufficiently waterlogged state to ensure long-term preservation of organic-rich contexts under current land-use regimes (Passmore *et al*. 1998, Chapter 2). Nevertheless, future hydrological changes (e.g. following enhanced drainage works) that are liable to induce a lowering of local groundwater levels may pose an indirect threat to long-term preservation of surviving archaeological and palaeoenvironmental resources.

7 The Landform Element Approach in Practice: Case Studies from the Till and Tweed

David G. Passmore and Clive Waddington

INTRODUCTION

GIS-based integration of geoarchaeological landscape classification and a consolidated and enhanced archaeological record satisfy a number of criteria for the effective and strategic needs of heritage management (Passmore *et al*. 2006). The long record of archaeological and palaeoenvironmental research in British river valleys has generated considerable information of value in this respect (see, for example, Needham and Macklin 1992; Howard *et al*. 2003), but its recognition and utility in a heritage management context is often limited. The approach adopted by the authors in north Northumberland is specifically intended to promote and facilitate wider recognition and understanding of both archaeological and palaeoenvironmental resources amongst a range of stakeholders (including planning authorities, developers, planning and environmental consultants, English Heritage, English Nature, Defra and the academic community). To this end a practical historic-environment guidance document for the Till-Tweed landscape has been produced (Waddington and Passmore 2006), which is accompanied by a full GIS database and 1:10,000 mapping of archaeology from aerial photographs for the Till and lower Tweed study blocks.

The purpose of this chapter is to illustrate, by means of case studies from selected parts of the Till-Tweed study area, how geoarchaeological and archaeological datasets may be combined to inform the framework for heritage management in these river valley settings. The first two examples, from valley reaches in the Breamish/Till and the lower Tweed respectively, serve to demonstrate the links between particular landform types and the full range of documented archaeological records, including upstanding monuments, cropmarks and lithic scatters, as well as potential remains yet to be discovered. They also establish the importance of assessing palaeoenvironmental resources to enhance our understanding of past land use activities. Such techniques may assume particular importance when the archaeological record is poorly understood, degraded or absent (Passmore *et al*. 2002). A third case study from the central part of the Milfield Basin demonstrates how close liaison between archaeological and geoarchaeological evaluation programmes can promote an enhanced understanding of landform, sediment and archaeological associations in landscapes with subtle but significant differences in age and geomorphological context. Finally, another site in the Milfield Basin is used to illustrate how the planning guidelines developed by this project have been used to inform geoarchaeological evaluation of a proposed aggregate quarry.

CASE STUDY 1: THE RIVER BREAMISH AT NEW BEWICK

This study reach spans a 3.5km stretch of the middle reaches of the River Breamish between New Bewick and Bewick Bridge (Figs 7.1 and 7.2). To the east of the Breamish the area is overlooked by a glacially streamlined Fell Sandstone escarpment that rises to 230m OD with localised drift cover and prominent bare rock crags (Category 1a; Figs 7.2 and 7.3; see also Figs 2.28 and 6.1). At lower elevations the Holocene valley floor is flanked by a complex group of depositional landforms associated with the Late Devensian deglaciation of the area, and which rise up to 45m above the present floodplain. These deposits have been described by Clapperton (1971b) and predominantly comprise sand and gravel deposited as ice-contact meltwater deposits (Category 1c) and inset glaciofluvial and glaciodeltaic outwash terraces (Category 1d) (Fig. 7.3). Southern margins of the present floodplain are overlooked by a glaciolacustrine terrace (Category 1g). Also present on the west-facing flanks of the escarpment are large fan-shaped landforms lying downslope of small tributary gullies; these are provisionally interpreted as Late Devensian alluvial fans. Meltwater-derived terraces locally feature kettle holes (Category 1f; Fig. 7.3), and where local drainage has been impeded these depressions have developed persistent small lakes, ponds and wetlands with associated organic-rich sedimentary sequences.

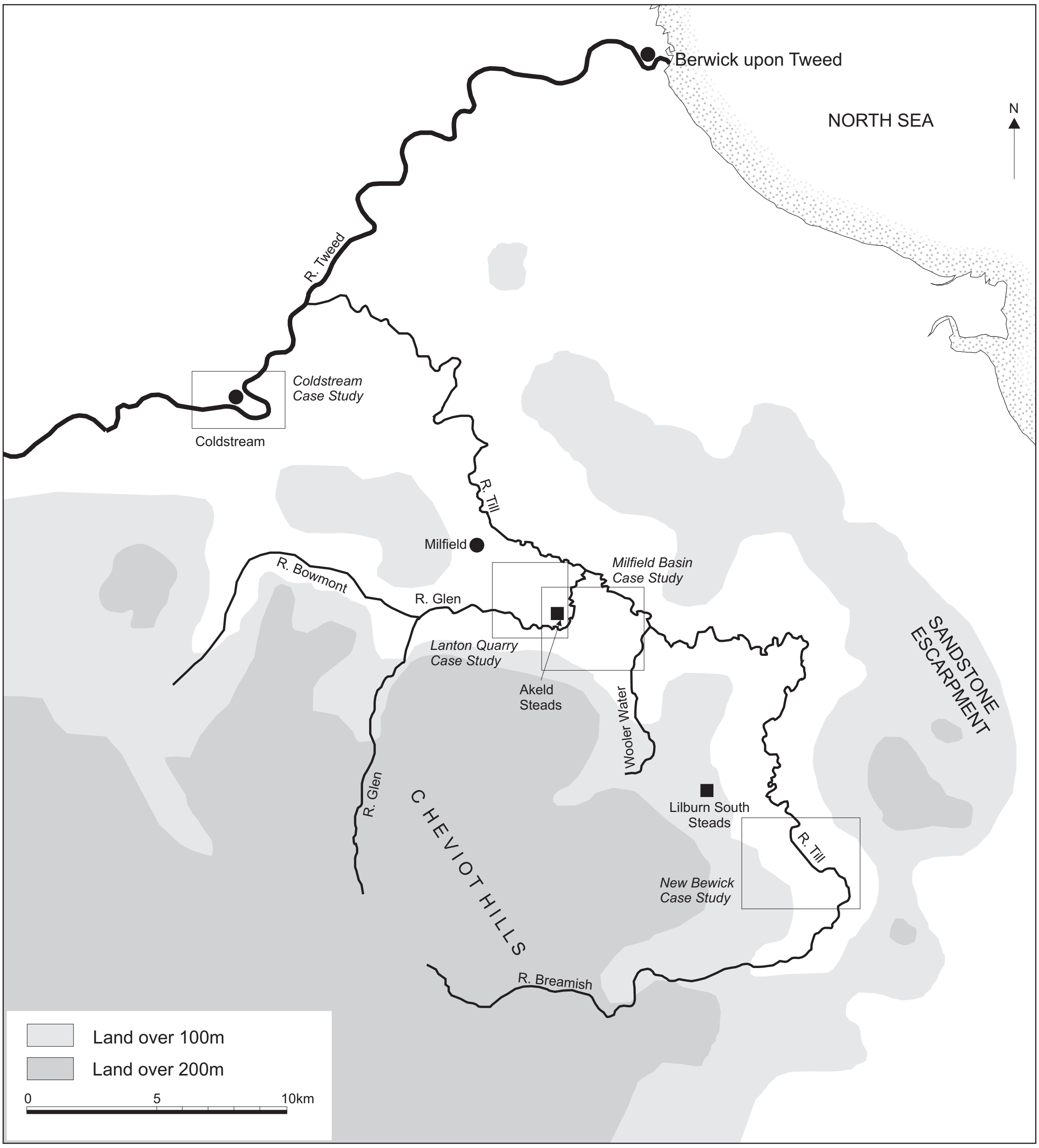


Fig. 7.1. Map of the river Till and lower Tweed river basins showing relief and location of case study sites.

Holocene alluvial deposits infill the valley floor of the Breamish throughout this area and are typically inset at least 5m below Late Devensian deposits (Figs 2.29 and 7.3). The alluvial valley floor has a maximum width of 1km in an alluvial basin upstream of New Bewick Bridge, but downstream of the bridge it occupies a relatively confined trench that is typically narrower than 0.5km (Fig. 7.2). A low-relief floodplain terrace (Category 2b) flanks the Breamish in the wider alluvial settings and locally features sinuous palaeochannels (Category 2c); these are distant from present watercourses and attest to changes in river channel location during the Holocene period. Valley floor relief is generally not pronounced and features no distinctive alluvial terrace scarps that delimit alluvial surfaces of differing age (Fig. 2.29). Nineteenth-century flood embankments have confined recent historic channel and floodplain development to a relatively narrow corridor of the valley floor (Category 2d), and here the present floodplain is inset up to 1.5m below the low-relief terrace surface (Fig. 2.29). Nineteenth-century canalisation of a 1.5km reach

Fig. 7.2. View over the Breamish (Till) valley looking west from the Fell Sandstone escarpment at Old Bewick, Till study block.

of the Breamish between New Bewick and Bewick Bridge has also necessitated artificial cut-off of several meander loops (Fig. 7.2).

Sedimentary sequences on the Holocene valley floor have been investigated through sediment coring and bank exposures BT1 to BT10 at Bewick Bridge (Fig. 7.3). Of particular interest here are three adjacent palaeochannels, cored at BT5, BT10 and BT2 and with basal ^{14}C dates of cal AD 390–600, cal AD 680–940 and cal AD 900–1160 (Fig. 2.29) respectively. In combination, these palaeochannels demonstrate localised shifts of the meandering gravel bed Breamish channel during the first and early second millennium AD and hence the greater part of the valley floor at Bewick Bridge dates from the post-Roman period onwards. However, it is acknowledged that palaeochannels of an earlier date may survive in wider parts of the valley floor (see also Chapter 2). The initiation of valley fill sedimentation in the study reach is currently undated, but it is assumed that alluviation began shortly after lateglacial incision of the valley floor.

Landform, sediment and archaeological associations of Lateglacial landscapes at New Bewick

Landforms modified and deposited during glaciation and retreat of Late Devensian ice sheets have surfaces that for the most part have experienced negligible modification by Holocene geomorphological processes, although post-glacial channel migration of the Breamish and its tributary streams may have locally truncated the distal margins of these deposits. These surfaces host a rich and mixed age group of earthworks, archaeological cropmarks and artefact scatters that testify to long-term occupation of the valley floor and its immediate surroundings (Fig. 7.3). To the east the valley is overlooked by the prominent Iron Age hillfort at Old Bewick, an unusual 'spectacle' type hillfort (Charlton 1935; Jobey 1965), and flanking Romano-British enclosures that are sited on the sandstone escarpment and command panoramic views across the valley to the Cheviots (Figs 2.28; 6.1; 7.2). Two steeply sloping fields (fields 16 and 17) on the drift-mantled hillside below Old Bewick were fieldwalked and yielded lithics of Mesolithic and Neolithic age (Fig. 7.3; see also Chapter 3). A group of prominent cairns along the crest of the escarpment have been positioned to be seen from the valley below. Although now robbed, one of these cairns seems to have been the likely repository from which a complete 'Grimston Ware' bowl was recovered during the 19th century and which is now in the British Museum. There is also an important group of cup and ring marked rocks surviving to the immediate west of the hillfort.

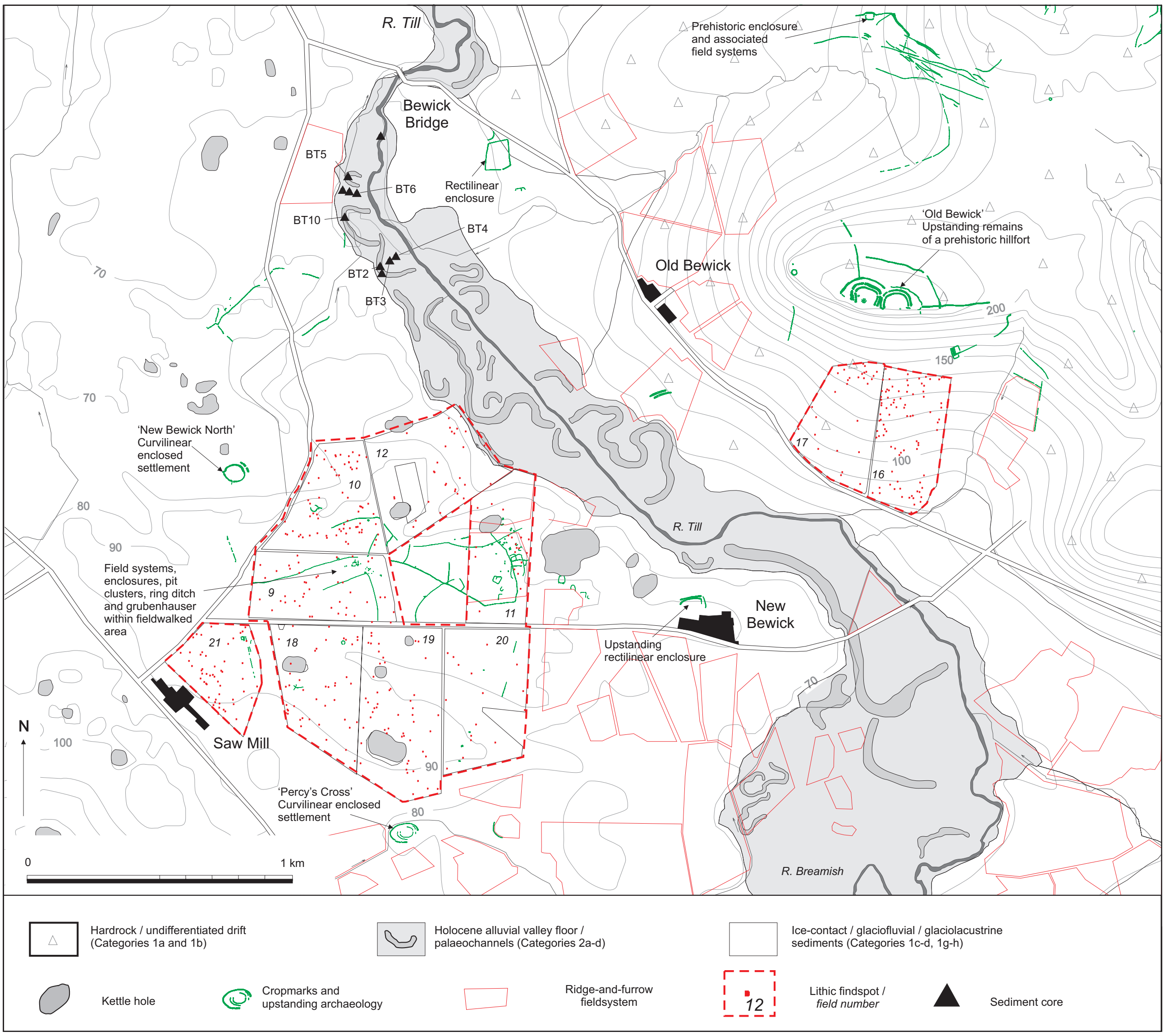


Fig. 7.3 Map of the New Bewick – Bewick Bridge study reach showing location of archaeological earthworks and cropmarks, lithic findspots and selected landform elements. Also shown are the locations of sediment cores mentioned in the text.

To the west of the river, the undulating glaciofluvial landscape features further prehistoric and Romano-British enclosures and, in the north-west part of the study area, a complex of buildings including *Grubenhäuser*-type structures constitutes an Anglo-Saxon settlement or industrial site (Fig. 7.3; Gates and O'Brien 1988). Eight large fields across this area and the southern part of the study reach were fieldwalked and all yielded lithics dating from the Mesolithic, Neolithic and Early Bronze Age periods (Fig. 7.3; Chapter 3). Mesolithic material was found across the entire area, suggesting that hunter-gatherer groups found these free-draining terraces close to the River Breamish attractive locales for settlement and subsistence activity. Lithic plots also indicate that in fields 12, 18 and 19 (Fig. 7.3) some Mesolithic material is closely associated with kettle hole depressions that are likely to have supported contemporary ponds or wetlands. Neolithic material was recovered from fields 9, 11, 12, 18, 19, 20, and 21 and this is likely to relate to cropmark evidence for a group of pit features visible on aerial photographs clustered around field 9. A pristine flint end scraper recovered from this locality suggests that ploughing of this area continues to disturb finds from buried and truncated archaeological features lying immediately below the present soil surface. Bronze Age activity is also evidenced by a ring ditch in field 18 and flints in the same fields as the Neolithic material, including a well-made barbed and tanged arrowhead found immediately next to a small kettle hole depression in field 18 (Fig. 7.3). The aerial photographs also showed the buried remains of a field system in this same area which is configured with a point of access that lies directly opposite a large kettle hole depression with standing water in field 12 (see also Chapter 6). This arrangement probably reflects a stock control system that could date from the late prehistoric period through to early medieval times and will require excavation in order to refine its chronology. In many other parts of the study reach arable cultivation during the medieval and post-medieval period is attested by extensive areas of ridge and furrow, including on the Holocene alluvial valley floor where they constitute the only archaeology recorded to date.

Landform, sediment and archaeological associations of Holocene landscapes at New Bewick

While the broader glaciofluvial landscape at New Bewick will have experienced relatively minor geomorphological activity during the Holocene, some degree of post-glacial sediment accumulation is to be expected in the cluster of kettle hole depressions inset into the sand and gravel terraces on the western side of the valley (Fig. 7.3). Where local drainage has been impeded these depressions have developed persistent small lakes, ponds and wetlands with associated organic-rich sedimentary sequences. Previous studies at Lilburn South Steads, 4km north west of New Bewick, have proven that such sites may have accumulated sediments to depths of 14m; here sedimentation started prior to *c*.13,400 cal BC (Jones *et al*. 2000) and potentially spans the entire Holocene period.

In view of the available geoarchaeological evidence in the study reach it is perhaps not surprising that archaeological records on the Holocene alluvial valley floor are limited to medieval or later ridge and furrow field systems near New Bewick Bridge, although it is recognised that the combination of limited ploughing and relatively poorly drained alluvial soils are not conducive to detection of cropmarks or artefact scatters. However, peaty sediments preserved in the palaeochannel fills of sediment cores BT2, BT5 and BT10 were assessed for palaeoecological potential and, in combination, offer some insight into the local and regional vegetation cover for intervals spanning the 5th–12th centuries AD.

The pollen records indicate that drier parts of the floodplain and adjacent glaciofluvial landsurfaces supported a fluctuating mixture of open woodland and grassland with evidence of pastoral and arable agriculture (see Chapter 2 for a full description). Cultivation of cereals appears to have been occurring from at least as early as cal AD 680–940, and subsequently around cal AD 900–1160, and the landscape was probably extensively deforested by the later medieval period. Plant macrofossils testify to the existence of local floodplain pond and wetland/marsh habitats in palaeochannel depressions, while analysis of insect fauna confirms the local presence of grassland/pasture on the alluvial valley floor. This combination of palaeoecological data indicates that local communities were actively engaged in woodland clearance and tillage from the mid-first millennium AD, and well before the medieval and later expansion of cereal production that is reflected in the extensive areas of extant ridge and furrow. It is also interesting to note that this record of early historic land-use and subsistence activity is derived from sedimentary sequences that are located less than 500m east of a probable Anglo-Saxon settlement site on the adjacent ice-contact meltwater and outwash terraces (Figs 5.1a and b; 7.3).

Summary

Given this range of archaeological and palaeoenvironmental deposits it is clear that different evaluation techniques are required in order to understand the past history of settlement and land use in this area, as well as to identify the location of surviving remains in advance of any development. Fieldwalking has demonstrated that the ploughsoil across Late Devensian sand and gravel terraces contains lithic scatters associated with Stone Age activity, whilst cropmark data reveal buried features in the same surfaces dating from the Neolithic through to early medieval periods. In the drift-mantled and craggy upland landscape to the east, aerial photography, walkover survey and topographic survey have been used to identify and record upstanding remains and rock art, whilst ridge and furrow field systems surviving on the valley floor, including Holocene alluvial surfaces, have been recognised by aerial photography and LiDAR survey. The landscape at New Bewick also features numerous kettle hole and Holocene palaeochannel depressions which offer the prospect of well-preserved buried archaeological material and palaeoenvironmental records of past land use and the character of the local environment. Dated alluvial sequences in the vicinity of Bewick Bridge have proven to be of historic age, but there remains the possibility of earlier landsurfaces and organic sedimentary sequences lying buried beneath the floodplain surface in other parts of the valley floor.

CASE STUDY 2: THE RIVER TWEED AT COLDSTREAM

The River Tweed at Coldstream occupies one of the widest alluvial basins in the lower reaches of the river (Fig. 7.1). Here the Holocene alluvial valley floor is 1.5km wide and lies inset within terraced and undulating surfaces up to 65m above the present floodplain that are associated with Late Devensian glaciation and deglaciation of the region (Figs 7.4 and 7.5; see also Chapter 2, Fig. 2.51). The highest elevation surfaces at Coldstream are interpreted as streamlined glacial/glaciofluvial

Fig. 7.4. View of the lower Tweed valley from the site of Wark Castle, looking east.

drift (Category 1b) with a south-west to north-east orientation reflecting the flow of former ice sheets towards the North Sea coast (Lunn 2004). Inset into these deposits are extensive hummocky ice-contact meltwater deposits (Category 1c) and glaciofluvial sand and gravel terraces (Category 1d). Locally, these deposits feature kettle hole depressions, enclosed basins and palaeochannel belts (Categories 1e–f). This suite of landforms forms the westerly extension of the Cornhill 'kettle moraine' complex described by Sissons (1967). Although chronological controls are currently lacking on this landform complex, it is provisionally assumed that the lowest elevation terraces of the sequence (T1–T2, see Chapter 2, Fig. 2.52), which lie 5m above the modern floodplain, represent the final stage of glaciofluvial outwash deposition before fluvial incision of the valley floor sometime during the Lateglacial/early Holocene period.

Holocene alluvial deposits in the Coldstream reach are inset up to 5m below adjacent Late Devensian glaciofluvial deposits and form a low-relief surface with numerous palaeochannels and terrace scarps that delimit alluvial surfaces of differing age. The Holocene valley floor is dominated by an extensive terrace (T3) which lies 3m above the modern floodplain and which typically comprises up to 2.2m of fine-grained alluvium overlying an indeterminate depth of fluvial sandy gravel (Figs 2.51; 2.52; 7.5). This terrace features several well-defined palaeochannels, including a major palaeomeander of the Tweed that survives on the southern side of the valley floor at West Learmouth (Fig. 7.5). Radiocarbon dates from the base of channel-fill sedimentary sequences cored at sites CDS1 and TW11 (Fig. 7.5) indicate that this channel was abandoned shortly before cal AD 1000–1170. The West Learmouth channel truncates an older palaeochannel on the southern margin of the valley floor which was abandoned shortly before 50 cal BC–AD 80 (Core site TW10 – see Chapter 2; Fig. 7.5), while a younger channel fragment on the north side of the Tweed at Lees Haugh was abandoned by cal AD 1280–1410 (Core site CDS11, Fig. 7.5).

The sequence of Holocene palaeochannels and (minor) terrace escarpments on the valley floor of the Coldstream sub-reach suggest that the floodplain has been formed by the migration and/or episodic avulsion of a large meander bend during the Holocene period. This meander bend migrated laterally to the east, from Wark-upon-Tweed to Cornhill-on-Tweed, giving a lateral age zonation of the floodplain with the oldest surfaces preserved in the south-west part of the valley floor (Fig. 7.5). Abandonment of the West Learmouth palaeochannel during the medieval period

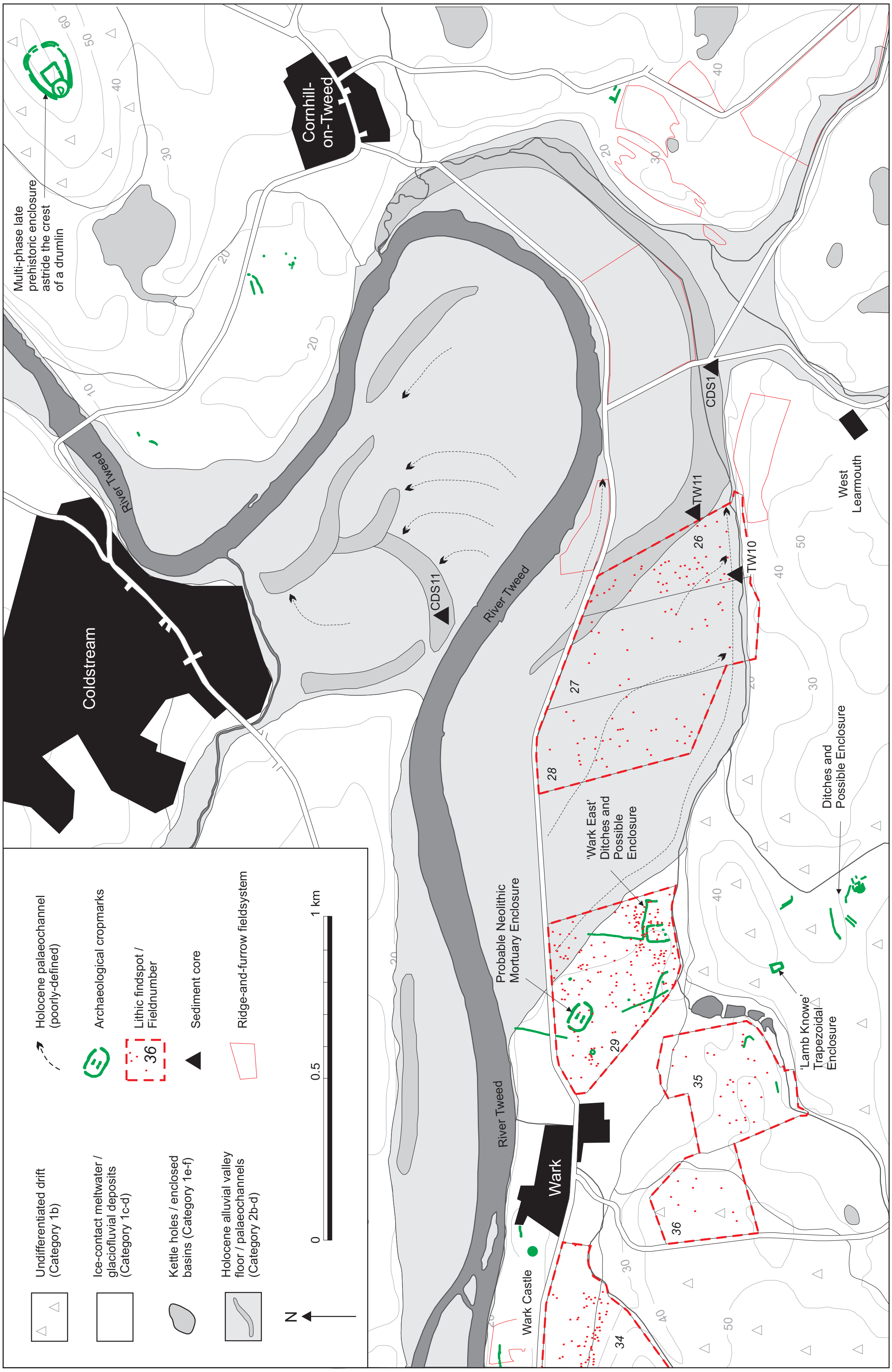


Fig. 7.5. Map of the Coldstream study reach showing location of archaeological earthworks and cropmarks, lithic findspots and selected landform elements. Also shown are the locations of sediment cores mentioned in the text.

may have been associated with neck cut-off of the meander loop; subsequently, the meander belt again developed laterally to the south-east, from the palaeochannel cored by CDS11 (abandoned *c.* cal AD 1280 – 1410) to its present position. Recent historic activity of the river has been confined by flood embankments and has witnessed minor floodplain alluviation associated with agricultural expansion and drainage intensification in the nineteenth century (e.g. Owens and Walling 2002; Owens *et al*. 1999).

Landform, sediment and archaeological associations of Late Devensian landscapes at Coldstream

Landforms modified and deposited during glaciation and retreat of the ice sheets have surfaces that for the most part have experienced negligible modification by Holocene geomorphological processes, this being restricted to fluvial erosion at the margins of the alluvial valley floor and localised colluviation on terrace bluffs and hillslopes. These surfaces contain a rich mixed-age archaeological palimpsest of earthworks, archaeological cropmarks and artefact scatters that testify to long-term occupation of the valley floor and its immediate surroundings (Fig. 7.5). Medieval remains are most spectacularly evidenced by the upstanding motte and bailey of Wark castle, located at the end of an esker ridge directly overlooking the River Tweed at Wark (Figs 2.14, 7.4 and 7.5). Aerial photograph transcriptions have identified a number of prehistoric or Romano-British ditch features and enclosures as well as medieval or later cultivation terraces (see Chapter 4). A number of these ditch features cluster on the lowest glaciofluvial outwash terrace surface that survives immediately east of Wark-on-Tweed and adjacent to the modern river channel (Fig. 7.5). Also prominent on this latter surface is a possible Neolithic mortuary enclosure, while fieldwalking of this area (field 29; Fig. 7.5) yielded a relatively high lithic count (27.5 lithics per hectare) with diagnostic material of Neolithic and Mesolithic age (see Chapter 3). Fieldwalking of areas lying on higher glaciofluvial surfaces to the immediate south-west of field 29 produced medium to low lithic counts of 8.6 and 3.9 per hectare respectively, perhaps indicating a lower level of activity than on surfaces closer to the Holocene valley floor. The only diagnostic material from these upper surfaces was of Mesolithic date.

Landform, sediment and archaeological associations of Holocene landscapes at Coldstream

Glacial and glaciofluvial landscapes at Coldstream locally feature kettle holes (Category 1f) and small enclosed basins (Category 1e) that are likely to have experienced localised sediment accumulation (including organic-rich deposits) and burial of former landsurfaces during Holocene times (Fig. 7.5). These sediment sinks have been shown to record detailed records of changing vegetation (as demonstrated at Lilburn South Steads in the Till valley, Jones *et al*. 2000), and hence warrant inclusion in any archaeological management and evaluation scheme. However, the most extensive environmental changes in the physical landscape at Coldstream have been associated with Holocene channel and floodplain development of the River Tweed.

Upstanding archaeological features identified on Holocene alluvial surfaces are limited to medieval or later ridge and furrow fieldsystems; however, fieldwalking of three adjacent fields on the T3 terrace surface (fields 26, 27 and 28, Fig. 7.5) all yielded artefacts with diagnostic material of Mesolithic age and suggest that the T3 terrace surface (excluding palaeochannel depressions) has received only minor alluviation over the greater part of the Holocene. Fields 27 and 28 produced relatively low counts of 3.6 and 6.4 lithics per hectare respectively, but field 26 yielded a very high count of 20.6 lithics per hectare (Chapter 3). The northern and southern margins of fields 26 and 27 extend over the West Learmouth palaeochannel, abandoned shortly before cal AD 1000–1170, and an older channel remnant (abandoned by cal 50 BC–AD 80) on the southern terrace margin. In these areas it is likely that repeated ploughing of the adjacent terrace surface has locally displaced prehistoric artefacts over younger (Iron Age – medieval) palaeochannel landsurfaces.

Analysis of the palaeoecological record of organic-rich channel fill sediments in TW10, TW11 and CDS1 has provided a record of the environment local to, and surrounding, the core sites contemporary with alluvial deposition (see Chapter 2, Figs 2.53 and 2.54). Pollen data show the late Iron Age and medieval landscape of the valley floor and adjacent terraces and uplands to be largely deforested or supporting open woodland, with evidence of grassland and pastoral agriculture. Analysis of insect fauna from core CDS11 confirmed the pollen signature of local grassland/pasture in the vicinity of the palaeochannel with the presence of species including dung beetles and 'clover' weevils. Plant macrofossil data indicate that the low-lying palaeochannel habitats were associated with wetland and/or open water with riparian margins. There is little direct evidence for anthropogenic activity in the pollen record from CDS1; however, the macrofossil record includes a charred breadwheat cereal grain (*Triticum aestivum*), charred cereal grains and a cereal stem (see Chapter 2, Fig. 2.53). This material is most likely derived from cereal processing in the vicinity of the site shortly after AD 1000–1170, by which time Wark Castle (located 2.5km west of the core site, Fig. 7.5) had been constructed.

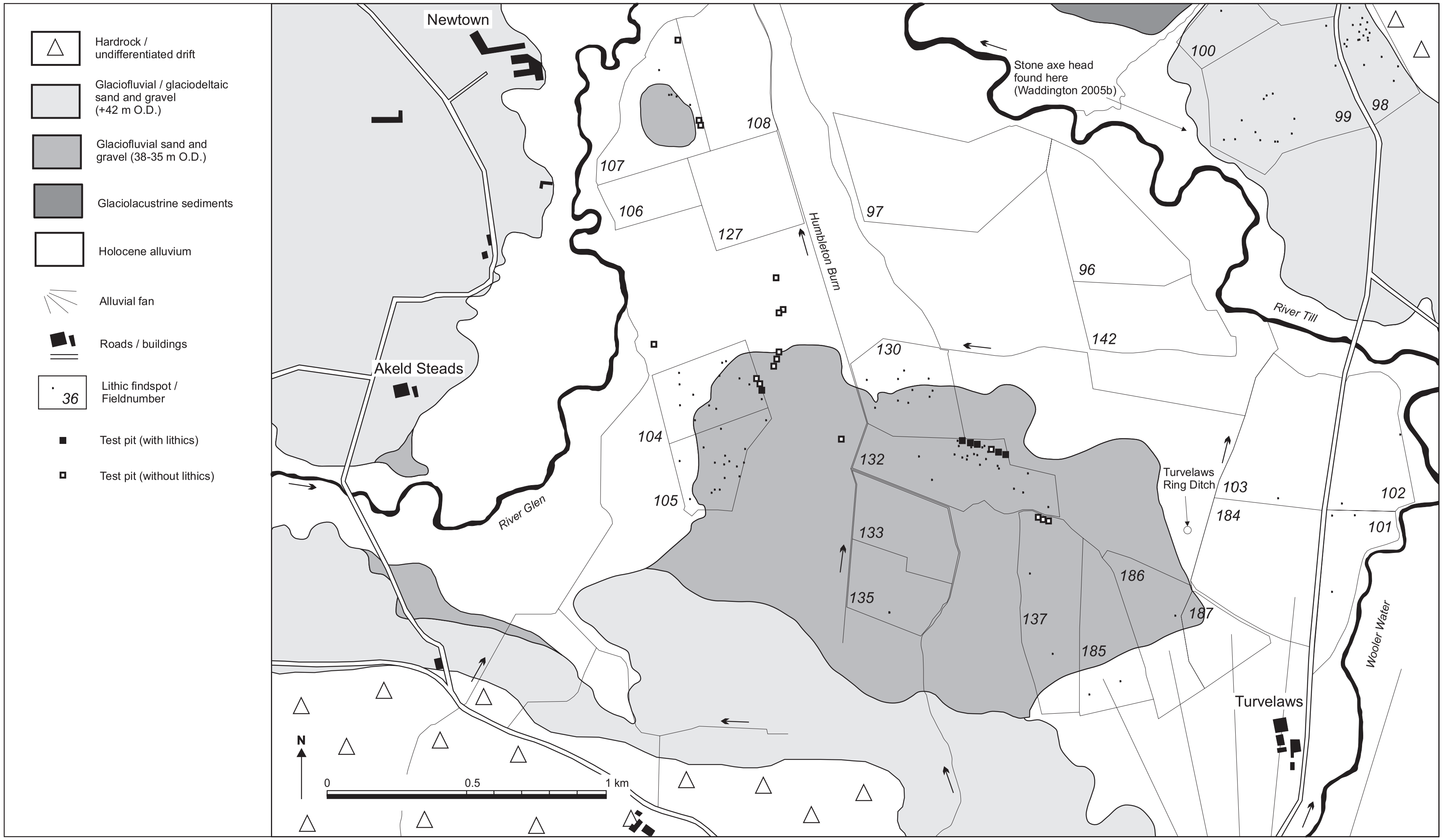


Fig. 7.6. Simplified geomorphological map of the central part of the Milfield Basin showing major glaciodeltaic and glaciofluvial sand and gravel terraces and Holocene alluvium. Also shown are archaeological cropmarks, areas fieldwalked (all numbered fields), lithic findspots and test pit locations. Note test pit labelled 10,155; see text for details.

Summary

Identification of landform elements at Coldstream, as at New Bewick, has provided the context for defining an appropriate range of field techniques to evaluate, map and record the archaeological and palaeoenvironmental potential of this area. The record of Holocene river channel and floodplain development in this part of the lower Tweed demonstrates multiple phases of channel avulsion and cut-off dating from the late Iron Age period, and these floodplain wetlands have served to preserve detailed records of historic land use activity. The preservation of late Holocene channel and floodplain deposits here is consistent with patterns of valley floor development recorded in many other Till-Tweed valley reaches (including New Bewick) as well as other UK river valleys and reflects, at least in part, the higher preservation potential of younger alluvial deposits (Lewin and Macklin 2003). However, Holocene alluvial surfaces at Coldstream locally host a greater time depth of archaeological remains than recorded at New Bewick, since here medieval field systems are augmented by an extensive assemblage of Mesolithic flints. Demonstration of the archaeological potential of these river terraces was achieved using fieldwalking and aerial photography; techniques that are both non-invasive and relatively inexpensive.

CASE STUDY 3: GLACIOFLUVIAL AND HOLOCENE ALLUVIAL TERRACES IN THE MILFIELD BASIN

The broad differentiation of extensive Late Devensian glaciodeltaic and glaciofluvial terraces and Holocene alluvial surfaces in the Milfield Basin has been established for many years (e.g. Clapperton 1971b). However, geomorphological mapping of valley floor landforms undertaken for this project has identified low-lying sand and gravel terraces (Category 1d) in the southern and western parts of the Milfield Basin in areas that had been previously mapped as Holocene alluvium (Payton 1980; 1992; Tipping 1998; Figs 7.1 and 7.6). The largest terrace in this group lies inset below glaciofluvial and glaciodeltaic deposits between Akeld Steads and Turvelaws and has a gently undulating surface 1–2 m above the main Holocene alluvial surface. A smaller terrace remnant is evident to the east of Newtown where it forms a small low-relief gravel surface that is completely surrounded by Holocene alluvium (Fig. 7.6). Both terraces have gently dipping margins that are onlapped by Holocene silts and clays. They are interpreted as reworked glaciodeltaic and glaciofluvial sediments that were deposited as a low-angle fan or terrace assemblage during incision of the River Glen through the main glaciodeltaic surface and underlying glaciolacustrine sediments following drainage of the pro-glacial Lake Ewart (see Chapter 2).

Upstanding Late Devensian glaciodeltaic and glaciofluvial sand and gravel terraces elsewhere in the basin host a rich archaeological record that includes buried monuments and lithic scatters of Late Mesolithic, Neolithic and Early Bronze Age date (Waddington 1999; see also Chapters 3–5); accordingly, the recognition of hitherto unidentified Lateglacial terraces prompted a fieldwalking programme of these and adjacent Holocene alluvial surfaces (Chapter 3). Fieldwalking of Holocene alluvial surfaces in central parts of the basin recovered very few artefacts and this probably reflects a tendency towards burial of prehistoric floodplain surfaces, although poor surface artefact visibility may also be a contributory factor (Fig. 7.6; Chapter 3 this volume). By contrast, the low-lying Lateglacial surfaces featured lithic scatters that also extended across their gentle terrace scarps and adjacent Holocene alluvial surfaces (Fig. 7.6). In these flat or gently sloping contexts it may be assumed that most of the artefacts were close to their original place of discard, with a degree of plough-induced displacement away from the slightly elevated gravels on to the surrounding alluvium. A line of 1m square test pits placed at 10m intervals was positioned across one of the lithic scatters. One pit (No. 10,155; Fig. 7.6) revealed a truncated stakehole at its base which contained charred wood that has been radiocarbon dated to the early 4th millennium cal BC, consistent with the dating of some lithics from the artefact scatter identified on the ploughed surface above (see also Chapter 3). This small-scale archaeological intervention, based on a question-led approach prompted by the landform element mapping, has allowed early human activity to be identified for the first time in the extensive low-relief valley floor of the Milfield Basin. These slightly elevated sand and gravel surfaces appear to have formed locales for hunter-gatherer groups and, later, Early Neolithic farming groups who built structures in these places. Although the alluvial veneer that locally covers these slightly elevated terraces impedes cropmark formation and recognition, fieldwalking supported by test-pitting can usefully target these areas to assess their archaeological potential and delimit areas of past human activity.

CASE STUDY 4: GEOARCHAEOLOGICAL EVALUATION AT LANTON QUARRY

Aggregate quarrying of Late Devensian glaciodeltaic sands and gravels on the western side of the Milfield Basin has been in progress since post-war times at a WW2 airfield near Milfield village (Fig. 7.1). Quarrying at this site is set to finish shortly, and the aggregate extractor is opening a new quarry (known as the Lanton Quarry) 1km to the south in a 40ha field located

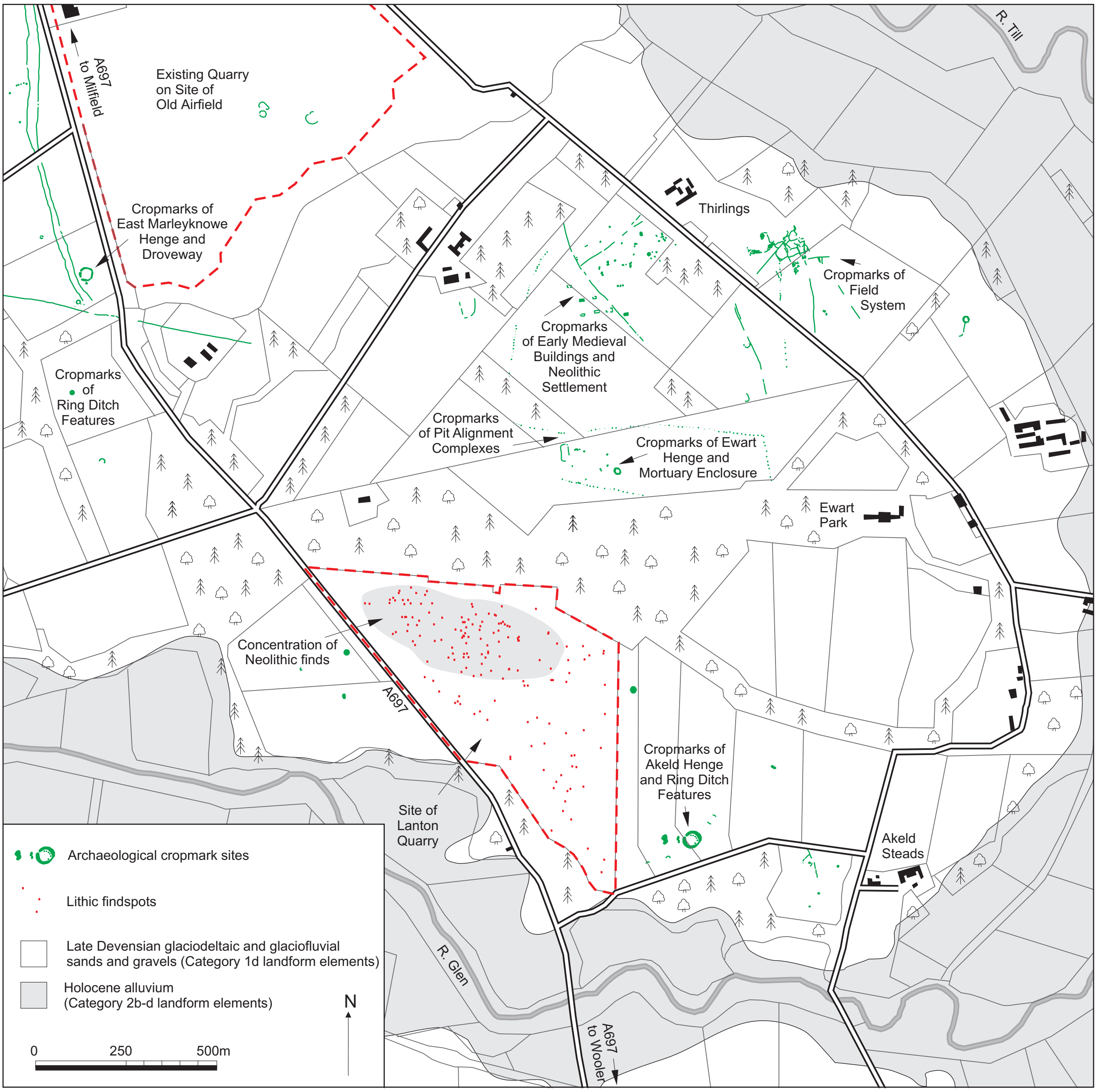


Fig. 7.7. Map of the Late Devensian glaciodeltaic and glaciofluvial terrace at Milfield showing the proposed Lanton aggregate quarry site, fieldwalking findspots and previously documented archaeological cropmarks.

on the same Category 1d terrace (Fig. 7.7). The Lanton site was already covered by a planning permission for mineral extraction; however, a new permission was sought so that the working life of the proposed quarry could be extended. This new permission was considered under modern planning controls and was informed by guidelines developed by the authors (Passmore *et al*. 2002). While no cropmark evidence for archaeological features had been documented within the site boundary, the field is located amongst a complex of Neolithic/Early Bronze Age monuments that includes two henges, ring-ditch cemeteries, pit alignments and a possible mortuary enclosure (Fig. 7.7).

In accordance with the planning system, the County Archaeologist requested that a staged approach to evaluating the archaeological and palaeoenvironmental potential of the site be adopted. An initial desk-based assessment was undertaken together with examination of aerial photographs. Since the surrounding fields that contain the henge monuments, pit alignments and other features are located on the same landform element, and were subject to the same agricultural regime as the quarry site when the aerial photographs were taken, the absence of features on the quarry site appeared to reflect a genuine absence of features detectable by aerial photography. However, the possibility for less monumental archaeological features, such as pits, hearths and postholes, still remained. Indeed, given the data collected from evaluation trenches at Coupland, Milfield North and Maelmin West (see above Chapter 5), it was considered that archaeological features were likely to include Neolithic pits, post-built buildings and hearth pits. As a consequence, the desk-based assessment was followed by an evaluation stage that comprised close-spaced fieldwalking. This method of archaeological evaluation was preferred to a series of linear evaluation trenches since the latter technique, while well suited to locating linear features associated with substantial monuments or slot-defined structures, is less effective at locating small and dispersed pit features that are typical of Neolithic and Early Bronze Age sites (e.g. see Hey and Lacey 2001, 52) developed on Category 1d terraces. Fieldwalking, however, can provide good spatial control for delimiting Stone Age activity on flat surfaces where movement of artefacts due to plough action is minimised. Furthermore, the type of lithic recovered can also provide some chronological control for the kind of buried remains that could be anticipated. Geophysical techniques such as magnetometry could have been of potential use but ambiguous results elsewhere on these surfaces, probably caused by the magnetic properties associated with volcanic rock, means they were not considered suitable in this instance.

Fieldwalking of the site was conducted at 2m intervals following a dedicated ploughing programme (see Chapter 3; Fig. 7.8). The fieldwalking revealed a distinct concentration of Neolithic flint tools at the north end of the field, including a range of arrowheads, scrapers, knives and blade tools (Figs 7.9–12). Two fragments of Neolithic pottery were also discovered within this cluster, together with a cache of interleaved flint blades, the latter having evidently been rotated due to the truncation of an underlying pit feature by the plough. This was confirmed by the excavation of a test pit below the cache. In this instance the fieldwalking was successful in delimiting the area of greatest early prehistoric archaeological sensitivity on the site, as well as providing information on the date and character of buried deposits surviving below the ploughsoil. It was acknowledged that subsequent evaluation trenching was unlikely to add further to the information gained by the fieldwalking since this had demonstrated that buried deposits on the site were likely to comprise predominantly Neolithic/Early Bronze Age pit-type features containing lithics and ceramic material. Following this exercise, permission was granted subject to a strip and record strategy that would ensure all archaeological remains ex-

Fig. 7.8. Close-spaced fieldwalking on the Lanton Quarry site.

Fig. 7.9. A range of Neolithic flint arrowheads and a possible spear tip discovered during fieldwalking at the Lanton site. Scale = 10mm graduations.

Fig. 7.10. Classic Neolithic end scraper and discoidal scrapers discovered during fieldwalking at the Lanton site. Scale = 10mm graduations.

Fig. 7.11. A knife made on nodular flint imported to the region discovered during fieldwalking at the Lanton site. Scale = 10mm graduations.

Fig. 7.12. A Neolithic serrated blade tool discovered during field-walking at the Lanton site. Scale = 10mm graduations.

posed by the topsoil strip would be recorded in plan. Options were left open as to how best to deal with the exposed archaeology once each stage of the stripping was complete. This could include either high or low-intensity excavation depending on the importance of the remains or, if nationally important remains were encountered, for them to be preserved *in situ*. As this volume goes to press, 10ha of the site has been stripped and recorded (Fig. 7.13). At the southernmost tip of the site a group of Anglo-Saxon *Grubenhäuser*-type structures were discovered, confirming the view that the edges of these Category 1d terraces formed foci for settlement activity that could exploit the proximity of the river channel and a source of fresh water. Elsewhere in the exposed area dispersed groups of Neolithic pits have been found (Fig. 7.14), together with a post-built Bronze Age house (Fig. 7.15) and a very heavily truncated post-built roundhouse of probable Iron Age date. All of these feature types are typical on the Category 1d terrace surfaces and all, including the *Grubenhäuser*, are highly unlikely to show on aerial photographs or to have been identified by evaluation trenching. They conform well to likely scenarios for archaeological preservation based on the assessment and the advice provided in Table 6.1 (Chapter 6) and thereby meet the expectations that could reasonably be envisaged. This is central to ensuring the effective use of the planning system; as the archaeology so far encountered on the site has not exceeded the initial expectations as defined by this study and the pre-determination evaluation, the process has succeeded in delivering a manageable level of risk for both the developer and the planning authority.

In a separate stocking area to the south of the proposed extraction limits, situated on a Holocene alluvial surface of the River Glen (landform element Category 2b), a poorly drained palaeochannel or flood basin depression (Category 2c) was identified during the desk-based assessment phase. The mitiga-

Fig. 7.13. The strip and record process underway at the Lanton Quarry site with features being catalogued and marked as they are revealed.

Fig. 7.14. One of the dispersed Neolithic hearth pits discovered at the Lanton site as a result of the strip and record approach. Features such as this are very difficult to find using evaluation trenching. Scale = 0.5m.

Fig. 7.15. The heavily truncated remains of the Bronze Age house discovered at the Lanton site. Structures such as this are very difficult to find or recognise through the use of evaluation trenching. Scale = 2m.

tion response in this case was to undertake sediment coring across the alluvial surface with assessment of sedimentary sequences and pollen analysis of organic-rich deposits recovered from the former channel or floodbasin. Analysis of these deposits is ongoing at the time of writing, but offers the prospect of yielding palaeoenvironmental data that may augment the archaeological record sited on upstanding Late Devensian sands and gravels located only a few hundred metres to the north.

PUTTING GUIDANCE INTO PRACTICE

The landform element approach that links archaeological remains to landforms and evaluation techniques, originally developed for the Milfield Basin (Passmore *et al*. 2002), has been utilised by the local authority in a number of recent development proposals in other Northumberland river valleys, and has also been recognised in the recently completed North East Regional Research Framework for the historic environment (Petts and Gerrard 2006). Results from this latest study have now extended and refined these classifications and have also informed a revised set of prospection and evaluation strategies (Waddington and Passmore 2005; Passmore *et al*. 2006; see also Chapter 6 this volume). It is also important to note that this approach allows areas that are currently free of any documented archaeological remains to be considered in terms of their potential for such material. Results from sites like New Bewick, Coldstream and the Milfield Basin described above provide clear evidence for such potential and underpin the consistent application of planning guidance. This approach to archaeological landscape management has also helped to foster and promote closer working relationships and improved dialogue between planners, curators, developers, archaeological contractors and researchers and this has been to the benefit of all.

This study has prioritised assessment of the valley floor environment in recognition of the particular pressures arising from aggregate extraction, and in the light of recognised geoprospection difficulties in alluviated environments (e.g. Brown 1997; Howard *et al*. 2003). However, the concept, techniques and evaluation criteria may be tailored to any environmental setting where management of the archaeological and palaeoenvironmental resource is an issue. In all cases, a GIS platform can be expected to bring clear practical benefits to heritage managers and developers and may be readily updated to accommodate new information. Furthermore, this approach also permits a more sophisticated and systematic analysis of links between the modern landscape, the environmental record and the archaeological dataset, and hence constitutes a valuable research tool. Dovetailing landscape development proposals with the objectives of regional research frameworks will help direct planners to the key questions concerning our understanding of the past. In future, this should mean that there is a clear purpose behind archaeological and palaeoenvironmental recording that moves beyond the simple recording of remains for posterity.

The considerable public interest in the archaeology and historic past of this country is clearly manifest in the viewing figures for television documentaries dealing with the subject. Commercially funded archaeology makes a significant contribution to such awareness and accounts for the majority of excavation and recording that takes place in this country today. The challenge facing historic-environment managers and developers is primarily one of finding the right balance between the goals of conservation and development and weighing up the potential loss against the potential gain resulting from intrusive work. It is hoped that the landform element approach set out in the preceding chapters will encourage dialogue amongst stakeholders and assist in providing a coherent, transparent and informative guide that sets out a clear method for managing developments that affect the historic environment of this area.

Appendix A

Supplementary Details of Sedimentary Sequences Recorded on Late Devensian Landform Elements

1. LATE DEVENSIAN GLACIOFLUVIAL AND GLACIODELTAIC TERRACES (CATEGORY 1D LANDFORM ELEMENTS)

Sediment cores from Transect MSH2, Milfield Basin

(See Figs A1 and A2; Chapter 2 for discussion)

Quarry section at Groat Haugh, lower Tweed valley

A small gravel pit near Groat Haugh in the lower Tweed valley (NT88864547) has cut through Category 1d glaciofluvial terrace sediments and revealed the sedimentary sequence to locally comprise over 6m of stacked, flat-bedded clast supported sandy gravel below a thin sandy alluvial soil (Fig. A3). Clasts exhibit imbrication that indicates a downvalley flow direction, and at least one bed has a shallow channel scour *c.*1.2m in depth and infilled with interbedded sandy fine gravels and fine-coarse sands. These sediments are interpreted as the deposits of a high-energy, aggrading river with a braided or anabranched channel network. Although no dating controls are available for this landform-sediment assemblage, the sedimentology and morphostratigraphy are consistent with deposition during the later stages of valley deglaciation with incision and reworking of tills and outwash sediment by high volumes of sediment-rich meltwaters.

2. LATE DEVENSIAN GLACIOLACUSTRINE DEPOSITS (CATEGORY 1G LANDFORM ELEMENTS)

Finely laminated fine sands, silts and clays and occasional beds of massive brownish grey clay are exposed in a river bank section at a meander apex of the River Breamish near Beanley (see Fig. 2.24). These sediments are locally truncated by 19th century and later fluvial gravels and reach an exposed depositional thickness of at least 3m. They are interpreted as glaciolacustrine deposits (Category 1g) that have been described in this part of the Hedgeley Basin by Clapperton (1971b). A radiocarbon age of 27,100 ± 200 ^{14}C years BP (SUERC-1149, see Table B1 below) has been obtained from humic acid extracted from clayey silt at a depth of 150cm. This date is likely to have been contaminated, at least in part, by older carbon and/or the hard-water effect, although it is broadly consistent with the geomorphological interpretation of a glaciolacustrine origin for this landform-sediment assemblage.

3. LATE DEVENSIAN PALAEOCHANNELS (CATEGORY 1E) / HOLOCENE BOG AND MIRE DEPOSITS (CATEGORY 2E)

Sediment cores at Galewood, Milfield Basin

A poorly drained boggy depression at Galewood, near Thirlings in the Milfield Basin (Fig. 2.35) has been mapped as Holocene bog and mire deposits (Category 2e) and is located in a larger Late Devensian palaeochannel (Category 1e) inset into a glaciodeltaic terrace surface (Category 1d; Fig. 2.35). Previous work has demonstrated this low-lying area to be locally infilled with up to 130cm of peaty silts and fine sand, silt and clay (Passmore *et al.*, 1998) overlying coarse sandy gravels, and the site has been re-cored recently as part of geoarchaeological investigations at Cheviot Quarry (Johnson and Waddington in press). Sediment logs from two cores (Galewood 1 and 2) are detailed in Table A1, and their locations are shown in Fig. A4. Sediment core Galewood 1 is representative of the sedimentary sequence infilling the wetland depression at Galewood; the upper part of the core comprises 87cm of fine sandy silt with occasional laminations of fine sand, occasional plant macrofossils and some limited root penetration. These relatively inorganic sediments overlie dark brown humified peaty silt

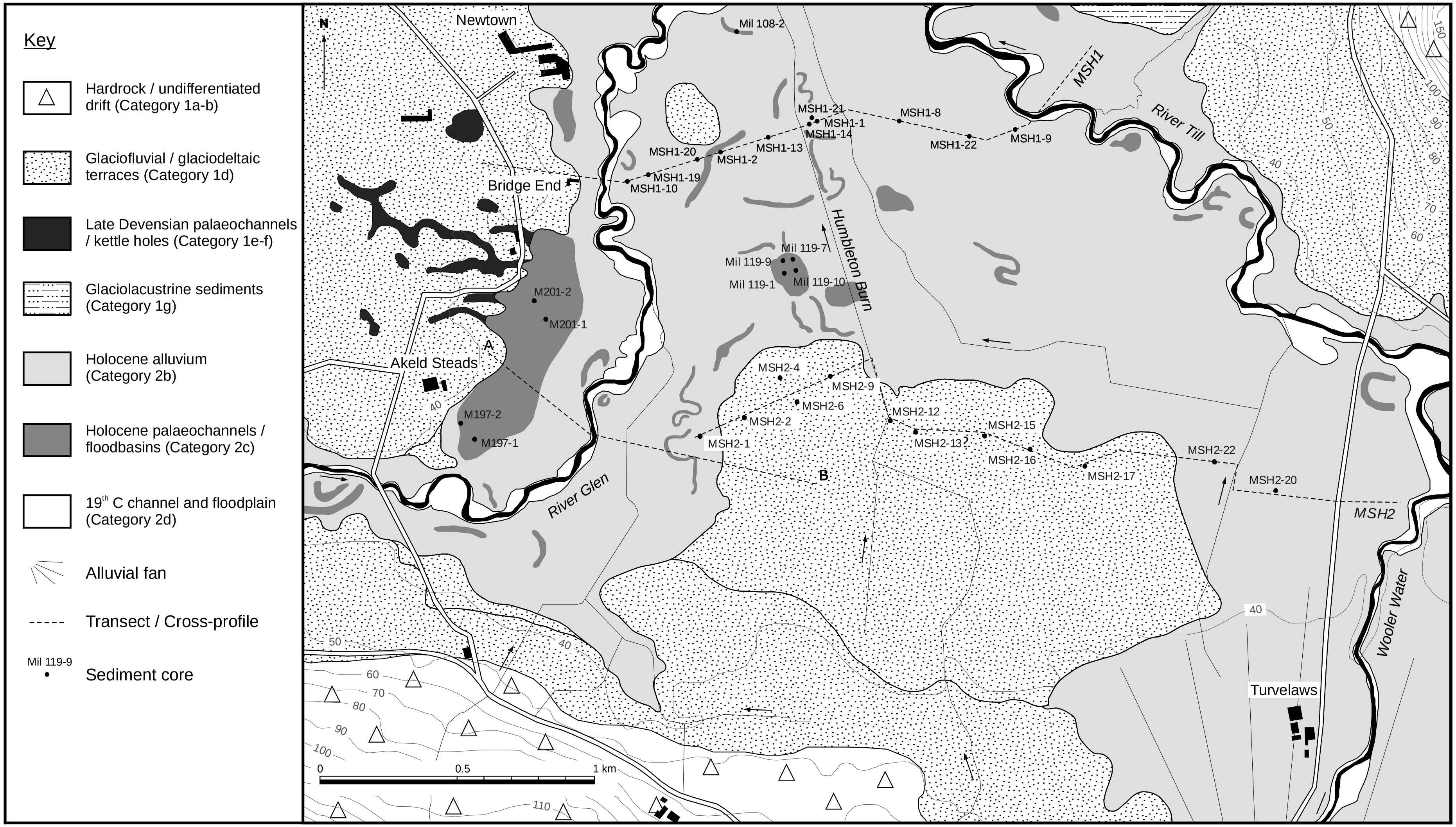


Fig. A1. Geomorphological map of the valley floor between Akeld Steads and Turvelaws (Milfield Basin) showing transects MSH1 and MSH2, cross-profile A–B, major palaeochannels and selected sediment core locations.

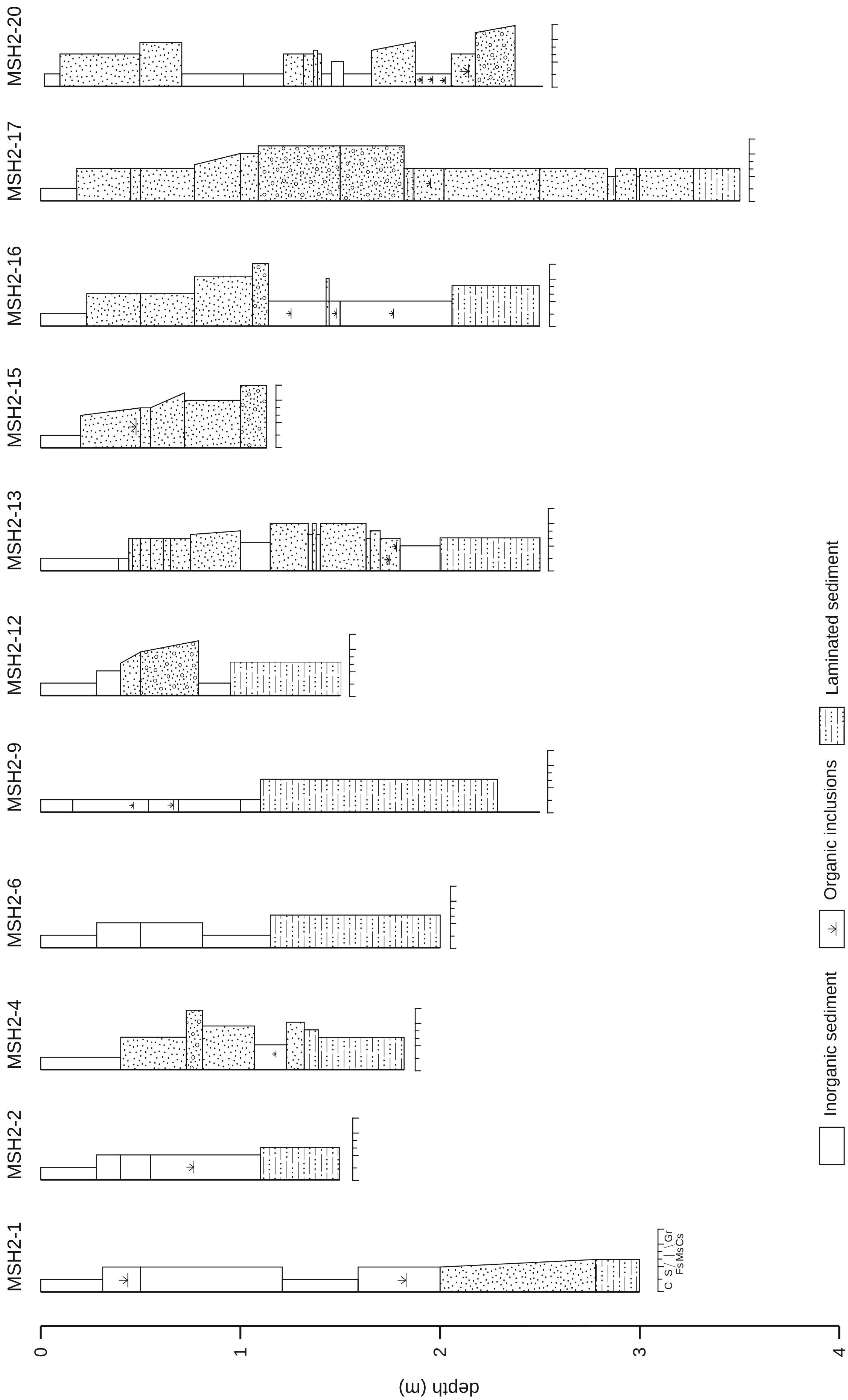


Fig. A2. Selected sediment core logs from Transect MSH2 (Milfield Basin) (see Fig. A1 for core locations).

Fig. A3. Glaciofluvial sands and gravels (Category 1d terrace) exposed in a small gravel pit near Groat Haugh, lower Tweed valley. Section is facing southwest with the River Tweed to the left.

Depth (cm)	Description
Galewood Core 1 (MI-1): NT 95005 32402	
0–15	Surface water
15–22	Dark brown humus / soil
22–36	Grey-brown organic rich fine sandy silt with occasional laminations, root penetration throughout
36–63	Light grey-brown fine-med sandy silt, occasional fine sandy lenses, some organic content, root penetration throughout
63–87	Light beige gleyed silt with fine sandy silt laminations, some root penetration, occasional macrofossils
87–115	Dark brown humified peaty silt, frequent macrofossils
115+	Sand and gravel
Galewood Core 2 (MI-3): NT 94962 32309	
0–20	Dark brown humus / soil
20–33	Dark grey-brown slightly sandy organic-rich silt, some fine sandy laminations, frequent macrofossils
33–43	Brown-grey peaty silt, frequent macrofossils, occasional sandy lenses, some root penetration
43–80	Mid-grey slightly sandy silt, frequent macros, some root penetration
80–108	Dark brown humified peaty silt, frequent macrofossils, occasional lenses of fine sand.
108–128	Grey-brown finely laminated fine sand and silt, occasional macrofossils and thin lenses of organic-rich silt
128+	Pink well sorted fine-med sand, fine gravel

Table A1. Sediment logs for Galewood cores 1 and 2 (see Fig. A4 for location details).

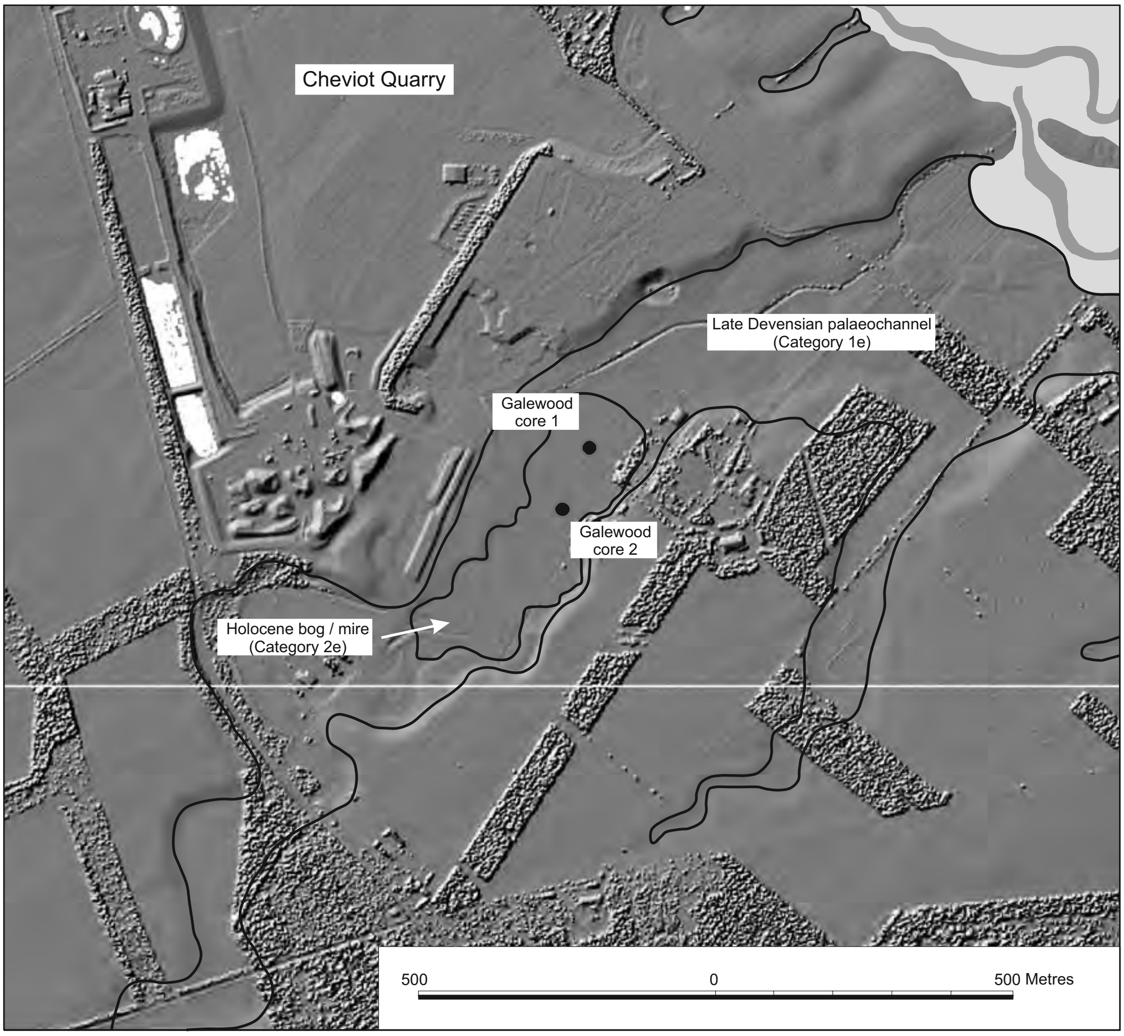


Fig. A4. LiDAR-derived image of the Cheviot Quarry – Thirlings area, Milfield Basin, showing location of Galewood cores 1 and 2.

Laboratory code	Sample reference	Core	Material	^{14}C Age (BP)	Calibrated date range (95% confidence)
SUERC-9080	GW90 (90cm)	Galewood 1	Wood fragment	11490±35	11,470–11,300 cal BC
SUERC-9081	GW115 (115cm)	Galewood 1	Wood fragment	12280±40	12,440–12,040 cal BC

Table A2. ^{14}C dates from Galewood core 1.

between 87 and 115cm which in turns seals coarse sand and gravel forming the lateglacial channel bed. Dating control for the period of peaty silt accumulation is provided by two AMS radiocarbon assays on small wood or twig fragments recovered from depths of 90 and 115cm. These gave dates of *c*.11,470–11,300 cal BC (sample GW-90, SUERC-9080; Table A2) and *c*.12,440–12,040 cal BC (sample GW-115, SUERC-9081; Table A2), respectively. Although these deposits have been mapped as Holocene peat bog and mire (Category 2e), the initial phase of organic-rich sediment accumulation at Galewood therefore appears to have commenced in the lateglacial (Windermere) Interstadial.

Kimmerston Bog, Milfield Basin

Previous investigations (Passmore *et al.*, 1998) have identified small palaeochannels developed on the surface of Kimmerston Bog (a Category 1e palaeochannel belt) with channel fill sequences that locally preserve buried peaty sediments. One core (Mil-17) revealed a buried peat horizon between 79–115cm overlying inorganic sands gravels and clays (to a recorded depth of 250cm) and buried by inorganic sands, silts and clays (Passmore *et al*., 1998). However, coring of a series of small channel-like depressions developed along the southwest margins of Kimmerston Bog (cores Mil-KB1, 2 and 3) all revealed up to 150cm of inorganic gleyed sands, silts and clays overlying compact clays. It appears therefore that peaty deposits in Kimmerston Bog palaeochannels are discontinuous and highly localised in extent. No dating controls are currently available on these deposits.

Appendix B

Supplementary Details of Sedimentary Sequences and Palaeoecological Analyses Recorded on Holocene Alluvial Landform Elements in the River Breamish/Till Study Block

1. INGRAM-NEW BEWICK (RIVER BREAMISH) REACH: SEDIMENTARY SEQUENCES

Brandon (Powburn) Quarry

Investigations of the sedimentary sequence in Brandon Quarry as part of this project were greatly limited by the wet-working aggregate extraction techniques that are currently in operation, and the degraded nature of exposures in the upper part of the quarry faces (Fig. 2.23). The following descriptions are based on available exposures and examination of sediment blocks excavated by quarry machinery at locations QP1-2 and QP3-4 (Fig. B1); they are therefore intended only as a general guide to the sediment sequence. The upper part of the sediment sequence comprises 0.5m of well-bedded sandy gravel with thin sandy lenses overlying massive clast-supported and imbricated gravels. The depth of the massive gravel unit exceeds 7m in the central part of the valley floor but thins to a depth of 3m towards the valley margins (Fig. B2). Underlying the gravel unit in the central part of the valley is a well-sorted medium sand layer *c*.1–1.5m thick which in turn overlies dark brown-grey massive clayey silts up to *c*.1.5m thick. This sequence is underlain across the width of the valley by pinkish-blue finely laminated (*c*.1–2 mm) silt-clay of undetermined thickness (Fig. B2).

Basal laminated silt and clay at Brandon Quarry is provisionally interpreted as glaciolacustrine sediment associated with the period of pro-glacial lake development during deglaciation of the Hedgeley Basin (see Chapter 2). Two samples of organic silt from the silt member overlying glaciolacustrine sediments were submitted for ^{14}C dating. Samples Bcd-1a and Bcd-1a* were taken from a single sediment sample recovered from a quarried sediment block *c*.7m below the working pond surface at location QP-2 (Figs B1 and B2). These were intended to give a minimum age for the final stages of glaciolacustrine sedimentation in the Powburn reach of the valley floor and to give a maximum age for the beginning of gravel deposition. Radiocarbon analyses gave dates of cal AD 1020–1220 (SUERC-1147; Table B1) and cal AD 770–1020 (SUERC-1148, Table B1), respectively. These assays are much younger than those obtained by Tipping (1992; 1994b, Table B1) from the overlying gravel member, while analyses of pollen preservation on the same sediment samples gave evidence of open woodland and sedge swamp that is broadly representative of a late Holocene environment (van der Schriek and Passmore, 2004). Accordingly these dates are rejected on the assumption that the sediment samples were contaminated by material of Holocene age during the quarry operation.

Hedgeley Quarry – Beanley

Sediments at Hedgeley Quarry were logged at 5 locations within the quarry (QH1-5, Fig. B1) and exhibit an upper fine member of poorly-bedded silty sand up to 1m thick, underlain by up to 4m of well-bedded clast supported gravels (Fig. B2). Interbedded within the gravel member are frequent cross-bedded sand lenses/layers up to 1m thick, occasional peaty clay layers up to 0.5m thick, and occasional tree trunks and branches (the latter deeper than *c*.2m below the terrace surface) (Fig. B2). Organic-rich layers within the gravel member are most probably the basal fill of shallow palaeochannels. Underlying the gravel member are dark brown-grey massive clayey silts up to 1.5m thick which in turn overlie pinkish-blue finely laminated silt-clay (1–2mm laminations) of undetermined thickness (Fig. B2). The stratigraphy of T1 at Hedgeley Quarry is therefore broadly equivalent to that at Brandon Quarry, although the gravel member is less thickly developed than at the upstream locality (Fig. B2).

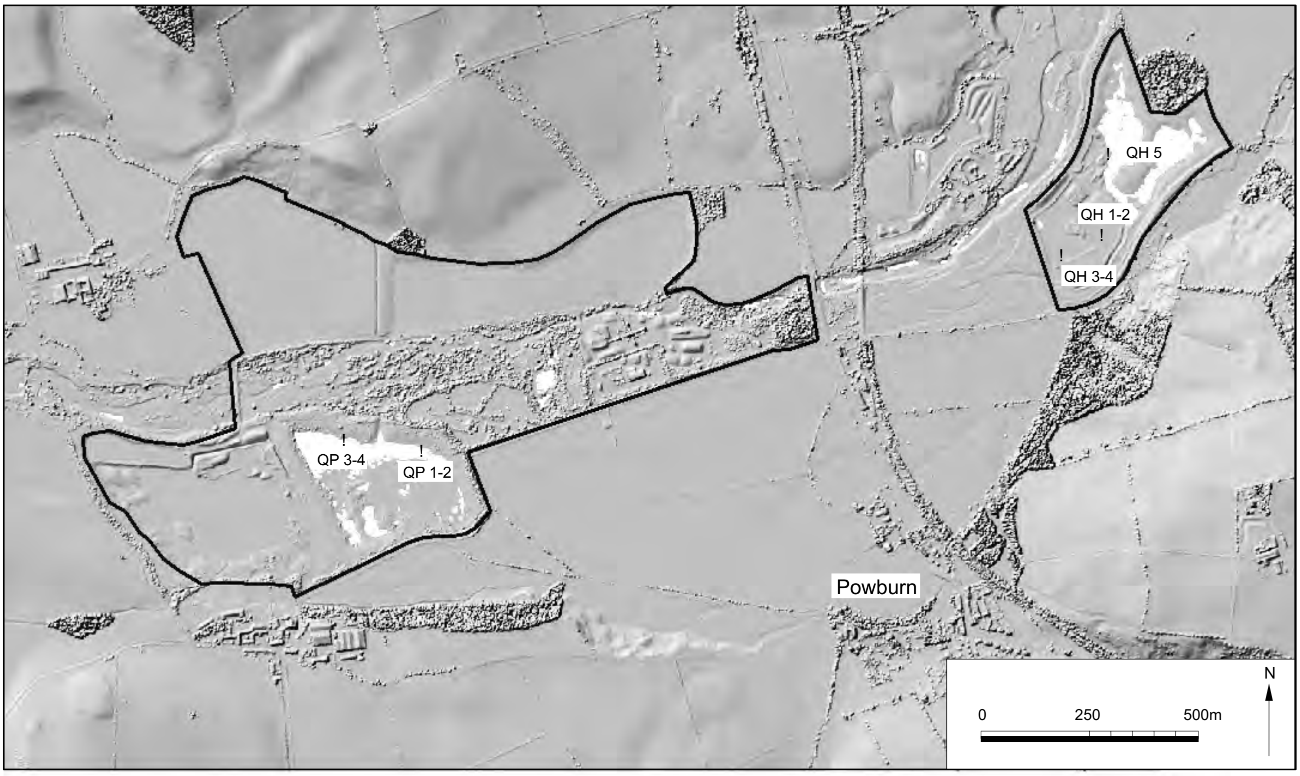


Fig. B1. LiDAR-derived image of Brandon Quarry and Hedgeley Quarry (River Breamish) showing quarry workings and locations of sediment investigations.

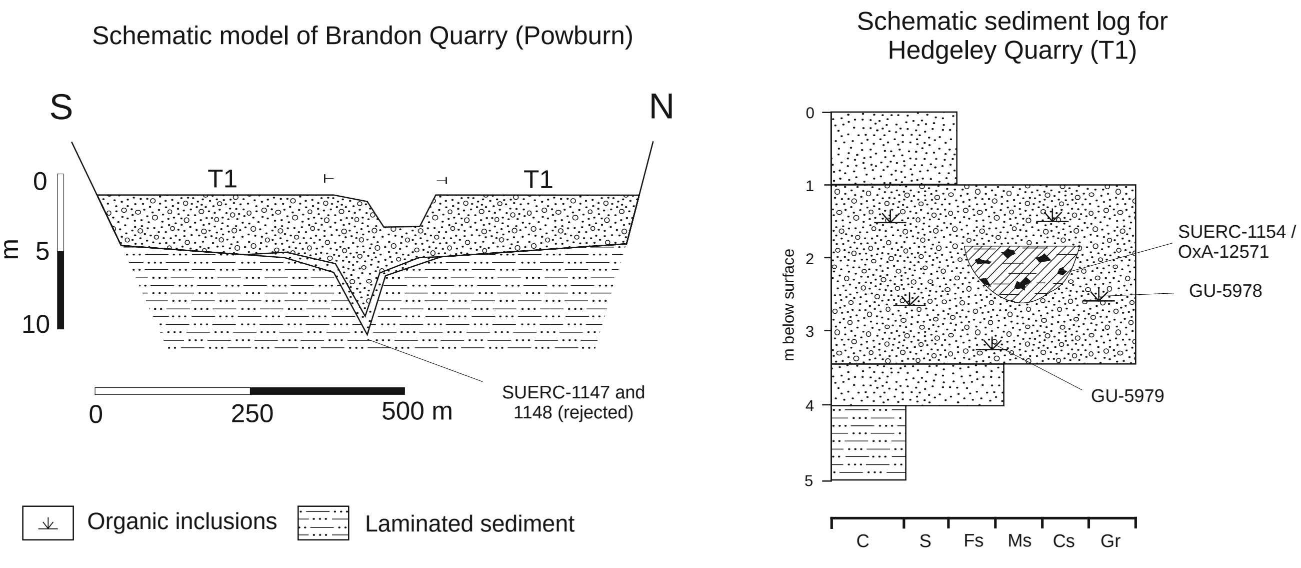


Fig. B2. Schematic valley fill models for the River Breamish at Brandon (Powburn) Quarry and Hedgeley Quarry.

Age control for the T1 terrace at Hedgeley is provided by four radiocarbon assays on wood, woody peat and wood macrofossils (Table B1). Samples of wood from the outer parts of *Alnus glutinosa* tree trunks at locations QH1 (sample Bcd-2) and QH3 (sample Bcd-3) (Fig. B2) gave dates of *c*.1490–1210 cal BC (GU-5978) and *c*.3960–3650 cal BC (GU-5979), respectively (Table B1; Fig. B3). Both tree trunks were buried in the T1 gravel member at a depth between 2–3m below the terrace surface. At location QH4 a woody peat deposit from the base of a shallow palaeochannel fill 2m below the terrace surface yielded two samples from the basal levels; sample Bcd-4a consisted of a woody peat that gave a date of *c*.800–410 cal *(i) Ingram-New Bewick reach*

Laboratory Code	Sedimentary sequence	Sample depth (below surface)	Sample	Material	$\delta^{13}C$ (‰)	^{14}C Age (BP)	Weighted mean	Calibrated Date (95% confidence)
SUERC-1147	QP2	*c* 700cm	Bcd-1(a)	organic silt, humic acid	-29.0	905 ± 40	T'=13.6; ν=1; T'(5%) =3.8	cal AD 1020–1220
SUERC-1148	QP2	*c* 700cm	Bcd-1(a)*	organic silt, humin fraction	-29.8	1140 ± 50		cal AD 770–1020
SUERC-1149	B18	*c* 150cm	Bcd-1(b)	clayey silt, humic acid	-22.3	27100 ± 200		* beyond calibration *
GU-5978	QH1	*c* 2m	Bcd-2	*Alnus glutinosa*	-28.2	3090 ± 50		1460–1210 cal BC
GU-5979	QH3	*c* 2m	Bcd-3	*Alnus glutinosa*	-28.6	5010 ± 60		3960–3650 cal BC
SUERC-1154	QH4	*c* 200cm	Bcd-4(a)	peat, humic acid	-30.1	2510 ± 40		800–410 cal BC
OxA-12571	QH4	*c* 200cm	Bcd-4(b)	*Alnus glutinosa*	-27.1	2529 ± 32		800–540 cal BC
SUERC-1155	B19/1	40–50cm	Bcd-5	peat, humic acid	-28.6	7485 ± 45		6440–6230 cal BC
GU-5972	B19/1	40–50cm	Bcd-5*	peat, humin acid	-28.6	7580 ± 130		6650–6210 cal BC
SUERC-1156	B12/1	90–96cm	Bcd-6	peat, humic acid	-30.6	430 ± 40		cal AD 1420–1620
OxA-15085	B12/1	80cm	Bcd-6(2)	Spikerush stem	-28.9	105 ± 24		cal AD 1680–1940
SUERC-1157	B6/2	66–73cm	Bcd-7	peat, humic acid	-29.0	800 ± 40		cal AD 1160–1280

(ii) Brandon (Powburn) Quarry (from Tipping 1992; 1994b)

Laboratory Code	Sample	Material	$\delta^{13}C$ (‰)	^{14}C Age (BP)	Weighted mean	Calibrated Date (95% confidence)
SRR-3659a	*c* -2.8m	Peat – humic fraction	-29.5	1890±45	1870± 32 BP T'=0.4; ν=1; T'(5%) =3.8	cal AD 60–240
SRR-3659b	*c* -2.8m	Peat – humin fraction	-29.2	1850±45		
SRR-3660a	*c* -3.5m	Peat – fine fraction	-29.6	2565±45	T'=8.5; ν=1; T'(5%) =3.8	810–540 cal BC
SRR-3660b	*c* -3.5m	Peat – coarse fraction	-30.1	2390±40		740–390 cal BC
SRR-3661a	*c* -2m	Peat coarse rootlets	-27.0	1800±50	T'=57.4; ν=2; T'(5%) =6.0	cal AD 80–380
SRR-3661b	*c* -2m	Peat – humic fraction	-29.3	2275±40		410–200 cal BC
SRR-3661c	*c* -2m	Peat – humin fraction	-29.3	1995±50		160 cal BC–cal AD 130
SRR-3662	*c* -1m	Peat "whole sample"	-30.4	10025±55		9860–9310 cal BC

Table B1: ^{14}C dates from (i) Ingram-New Bewick reach (Till-Tweed project) and (ii) Brandon (Powburn) Quarry obtained by Tipping (1992; 1994b)

Table B1. ^{14}C dates from (i) Ingram-New Bewick reach (Till-Tweed project) and (ii) Brandon (Powburn) Quarry obtained by Tipping (1992; 1994b).

BC (SUERC-1154) while an individual *Alnus glutinosa* twig from the same peat sample (Bcd-4b) gave a date of 800 - 520 cal BC (OxA-12571) (Table B1; Fig. B3).

Between Hedgeley Quarry and Beanley the T1 surface persists as the most extensive Holocene alluvial fill in this part of the valley. Sedimentary sequences beneath the terrace surface have been investigated at several sediment core and bank section locations (Fig. 2.24). These show a sedimentary succession that is similar to that at Hedgeley Quarry with up to 3.5m of bedded sandy gravels capped by up to 1m of fine silty sand alluvium (Fig 2.25). The T1 surface in this reach also exhibits numerous low-sinuosity palaeochannels with maximum channel widths ranging between *c*.25–35 m. Sediment cores from these T1 palaeochannels (e.g. sites B8 and 19) revealed infill sequences to comprise up to 1.5m of silt and sand overlying coarse gravels of the former channel bed. A comparatively shallow fine-grained channel fill at site B19 comprised 0.5 m of humified peaty silt overlying sandy gravels (Fig. 2.25); a peat sample from the lower levels of this fill was submitted for ^{14}C dating on the humic acid (Bcd-5) and humin (Bcd-5*) fraction and gave dates of *c*.6440–6220 cal BC (SUERC-1155) and *c*.6650–6110 cal BC (GU-5972), respectively (Table B1).

Inset into the T1 terrace between Hedgeley Quarry and Beanley are several well-developed alluvial terrace scarps that delimit alluvial surfaces of differing age (Figs 2.25 and 2.25). These terraced surfaces post-date the main T1 terrace and occupy a corridor up to 200m wide on either side of the present chan-

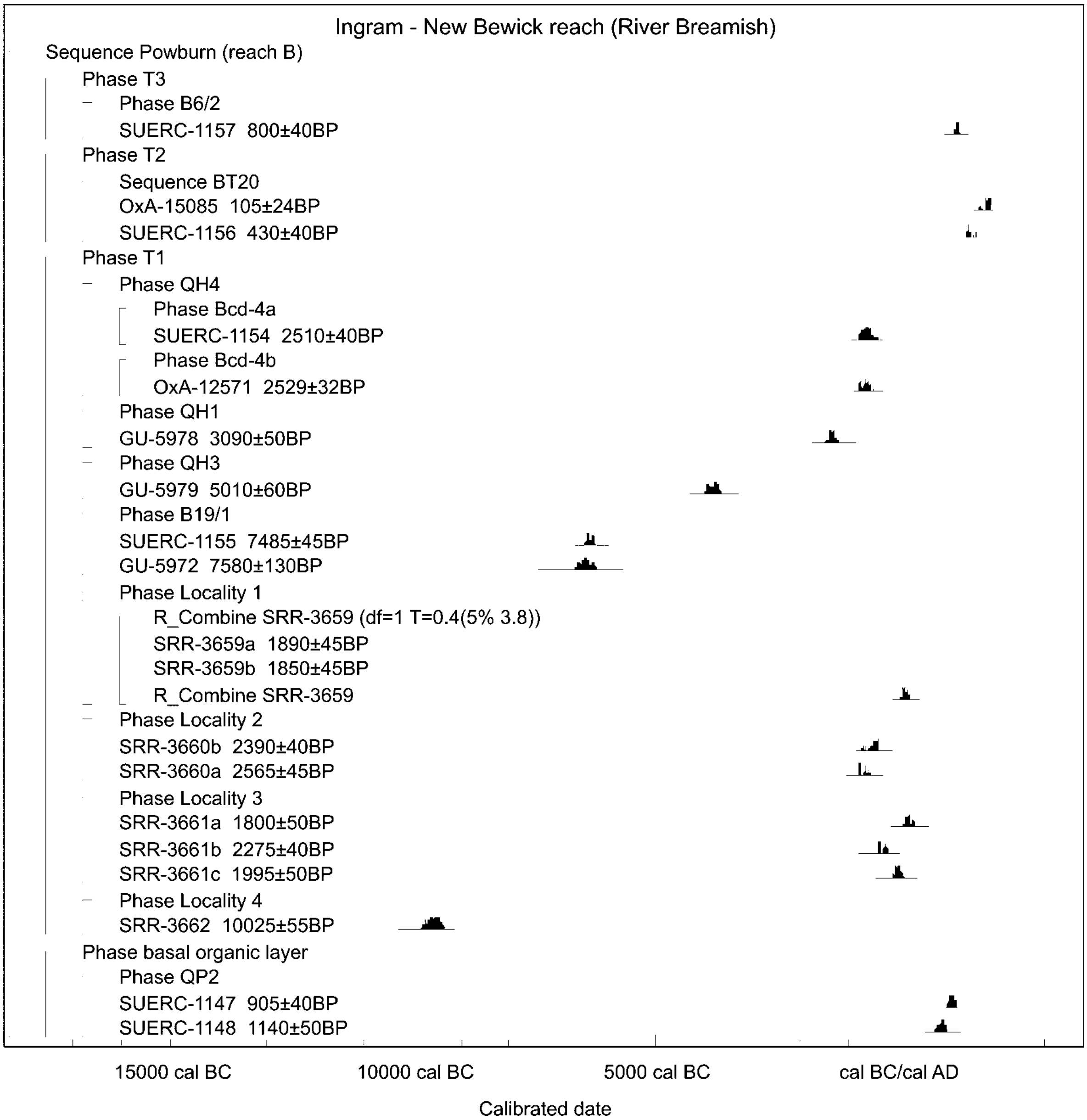


Fig. B3. Probability distributions of calibrated ^{14}C dates from Ingram-New Bewick reach (River Breamish).

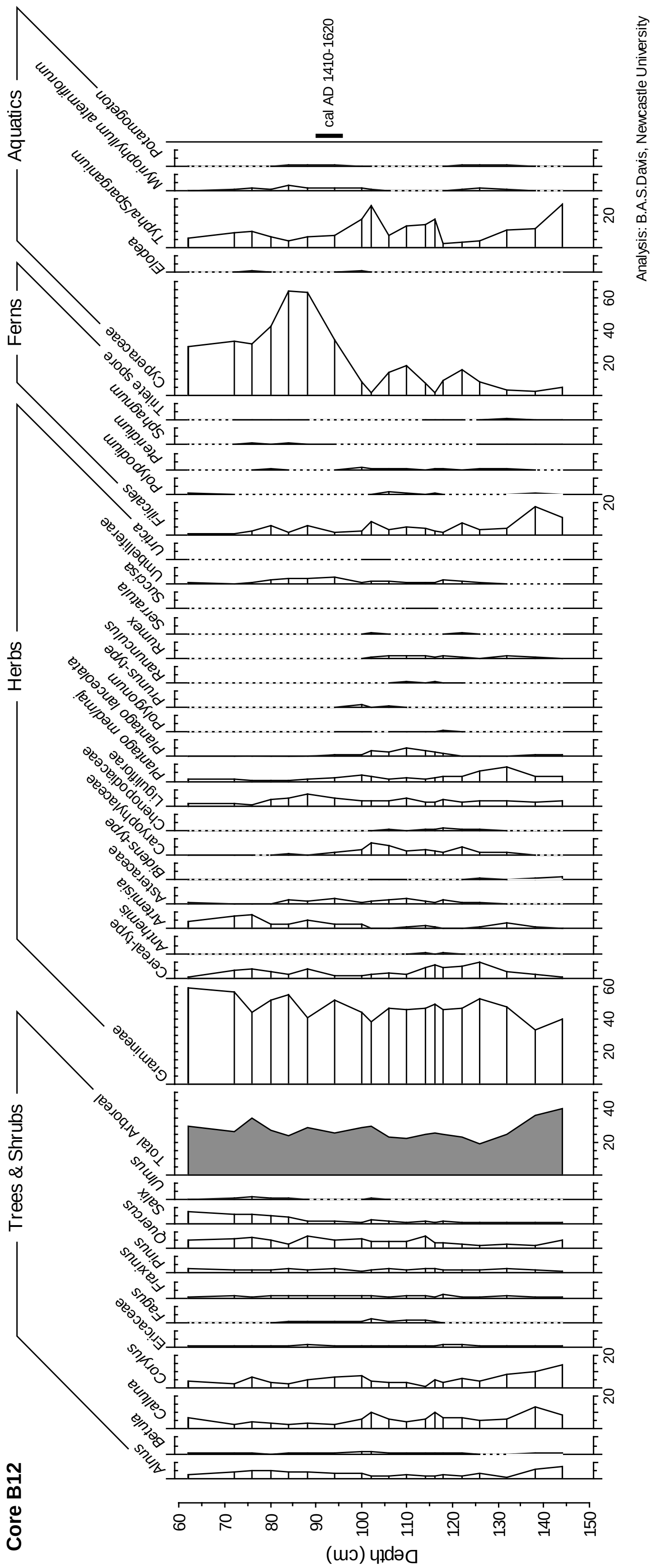


Fig. B4. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core B12, Beanley, Breamish valley.

nel. A cut-bank section west of Beanley (site B36, Fig. 2.24) reveals the local sedimentary sequence to comprise up to 0.75m of poorly bedded sand and silt alluvium overlying at least 0.75m of imbricated sandy gravel. Terrace scarps are often coincident with well-developed palaeochannels of higher sinuosity and narrower width (typically between 10 and 15m) than those characterising the T1 surface. Palaeochannels have been cored at several locations (e.g. sites B2–7, 12–13, 20–23, 27–30) and are infilled with up to 1.5m of fining-upward sequences of fine gravel, sand and silt with occasional beds of peat and silty clay lenses with wood and plant remains. Two palaeochannels from these inset terraces have been radiocarbon dated on samples taken at or near the base of peaty channel fills. Core B12 was extracted from a palaeochannel remnant located on the eastern fringe of the valley floor (Fig. 2.24) and revealed a fine-grained channel fill sequence 1.4m thick overlying channel bed gravels (Fig. 2.25). Sample Bcd-6 is from a depth of 0.9m and yielded a date of *c*. cal AD 1410–1620 (SUERC-1156; Table B1). Core B6 was extracted from a well-preserved, sinuous palaeomeander with a 0.75m thick peaty fill that directly overlies channel-bed gravels (Fig. 2.24). A basal peat sample (Bcd-7) from this site gave a date of *c*. cal AD 1160–1290 (SUERC-1157; Table B1).

2. INGRAM-NEW BEWICK (RIVER BREAMISH) REACH: PALAEOECOLOGY OF ALLUVIAL SEQUENCES

Low Hedgeley Quarry site

Two bulk samples from woody peat (QH4, dated to *c*.800–410 cal BC; Table B1) and silty peat (QH5) at the base of channel fill deposits at Hedgeley Quarry (Figs B1 and B2) were assessed for pollen preservation and macrofossil content (Table B2). Both samples have preliminary pollen assemblages that are characteristic of open woodland with grassland, while QH5 also exhibits evidence of a local sedge-dominated wetland. Macrofossil remains from QH4 contain a significant number of seeds that derive from species found in wetland or river margin habitats, including *Carex* spp., *Glyceria fluitans*, *Ranunculus cf. sceleratus*, *Rumex crispus* and *Saponaria officinalis* (Table B2), which suggest that the local palaeochannel environment during the Late Bronze Age–Early Iron Age was a low energy marsh-wetland habitat. The presence of *Alnus* and *Rubus* seeds in this sample suggests some woodland or shrub vegetation in close proximity to the palaeochannel margins. A similar habitat reconstruction is offered by the macrofossil record from sample QH5 (Table B2); the presence of *Carex* spp. seeds confirm the pollen evidence for a local wetland with sedges, while the presence of shade-intolerant species and absence of arboreal species suggests limited woodland cover in the immediate vicinity of the site.

Sediment core B6

Palaeoecological analyses on channel fill sediments at B6 spanned organic-rich sediments between 0 and 73cm (Fig. 2.26), although pollen analysis was limited to an assessment of preservation potential only and yielded provisional data from seven countable levels between 6 and 66cm (van der Schriek and Passmore, 2004). The sediment sequence has a basal date of *c*.cal AD 1160–1290 at 66–73cm (Table B1) that corresponds with macrofossil evidence of a wetland marsh-type habitat and substantial local vegetation cover. Seeds from wetland species, including sedge (*Carex* spp.) are abundant between 30 and 50cm and indicate that floodplain wetland conditions persisted as the channel infilled after this date. The presence of *Caltha palustris,* a shade intolerant species, suggests that the site was surrounded by a limited tree cover, while grassland species including Poaceae, *Potentilla erecta* and *Cerastium arvense* below 35cm are probably derived from drier floodplain and terrace environments in close proximity to the site. Pollen data confirms the presence of open woodland and grassland in the locality for sediments below 30cm, while cereal grains are also recorded below 52cm. In the upper part of the sediment sequence above 35cm there is a reduction in wetland macrofossil types that most likely reflects a combination of sedimentation above the water table and localised disturbance of the habitat. Analysis of insect fauna in this part of the record provides only limited interpretable information, although the presence of *Aphodius* is suggestive of local grassland and(or) pasture.

Sediment core B12

Core B12, located in a palaeochannel that undercuts the valley side near Beanley (*c*.1.5km downstream from Hedgeley Quarry, Fig. 2.24), contains an infill sequence 145cm thick with organic-rich and peaty silts and clayey silts below 76cm (Fig. 2.26). This sequence has been dated at 90–96cm to *c*. cal AD 1410–1620 (SUERC-1156) and at 80cm to *c*. cal AD 1680–1940 (OxA-15085; Table B1). A full pollen analysis on nineteen levels between 62 and 144cm was undertaken and revealed a vegetation record that exhibits no significant terrestrial vegetation changes throughout the sequence (Figs. B4 and 2.26). Woodland is limited at below 40% total terrestrial pollen (TTP) and the vegetation landscape is dominated by grassland and herbs. No single taxa appear important in the woodland composition which reflects a mixed temperate broadleaf community of *Quercus* and *Corylus*. *Calluna* pollen persists throughout the sequence and is probably derived from heath on the adjacent Fell Sandstone escarpment. The presence of cereal-type pollen and associated ruderal taxa throughout the sequence points to localised arable production during the later medieval and early post-medieval period.

Low Hedgeley Quarry (Breamish / Till valley)						
Sample	Depth (cm)	^{14}C	Sediment	Pollen Assemblage*	Macrofossil remains	
					volume (ml)	species present (count)
QH4	*c* 200	800–410 cal BC	Woody peat	Open woodland, grassland*	75	*Cerastium arvense* (3) *Stellaria media* (1) *Alnus glutinosa* (7) *Rubus fruticosa* (1) Caddis fly larvae cases (1) *Carex* spp. (1) *Glyceria fluitans* (8) *Ranunculus* cf. *sceleratus* (14) *Rumex crispus* (3) *Saponaria officinalis* (1) *Juncus* spp. (1)
QH5	*c* 200	--	Silty peat	Open woodland, grassland, sedges*	175	*Juncus* spp. (10) *Ranunculus repens* (1) *Potentilla palustris* (3) *Carex* spp. (12) *Cerastium arvense* (1)
* data from pollen preservation assessment only (van der Schriek and Passmore, 2004)						

Table B2. Summary of sediment type, ^{14}C chronology, pollen assemblages and macrofossil analyses for Low Hedgeley Quarry samples, Breamish / Till study block.

Laboratory Code	Sedimentary sequence	Sample depth (below surface)	Sample	Material	$\delta^{13}C$ (‰)	^{14}C Age (BP)	Weighted mean	Calibrated Date (95% confidence)
SUERC-1158	BT2	200–214cm	BTcd-1	peat, humic acid	-29.5	1015 ± 40		cal AD 900–1150
OxA-15049	BT2	97cm	BTcd-1(2)	*Carex* sp, seeds	-25.9	229 ± 28		cal AD 1640–1950
SUERC-1159	BT5	160–170cm	BTcd-2	peat, humic acid	-28.4	1585 ± 40		cal AD 390–570
OxA-15050	BT5	43cm	BTcd-2(2)	*Carex* sp, seeds	-25.9	171 ± 28		cal AD 1660–1955
SUERC-1160	BT10	95–110cm	BTcd-3	peat, humic acid	-29.3	1220 ± 40		cal AD 670–940
OxA-15051	BT10	65cm	BTcd-3(2)	*Carex* sp, seeds	-27.1	182 ± 27		cal AD 1650–1955
GrA-23759	BT19	192–195cm	BTcd-4(a)	*Alnus glutinosa*	-31.7	385 ± 35		cal AD 1440–1640
GrA-23760	BT19	192–195cm	BTcd-4(b)	*Salicaceae*	-28.0	825 ± 35		cal AD 1150–1270
GrA-23761	BT18	170–185cm	BTcd-5(a)	herbaceous plant fragments	-27.7	310 ± 35		cal AD 1460–1660
GrA-23763	BT18	170–185cm	BTcd-5(b)	*Alnus glutinosa*	-29.3	1040 ± 35		cal AD 890–1040
GrN-28096	BT20	175–190cm	BTcd-6	peaty silt, humin fraction	-29.4	520 ± 30	1826± 37 BP T′=42.0; ν=1; T′(5%) =3.8	cal AD 770–1160
GrN-28097	BT20	175–190cm	BTcd-6	peaty silt, humic acid	-29.9	1060 ± 80		cal AD 1320–1450

Table B3. ^{14}C dates from New Bewick – Weetwood reach (River Breamish / Till).

This activity was most likely focused on the nearby glaciolacustrine, or probably the ice-contact sand and gravel terraces immediately to the east (Fig. 2.24), and the relative abundance of herbaceous taxa in the lower part of the sequence may suggest greater landscape disturbance during the period before *c.* cal AD 1410–1620 than immediately afterwards.

Aquatic pollen is relatively limited in the lower part of the sequence and this is consistent with the macrofossil record which is suggestive of an un-vegetated ox-bow lake environment (Fig. 2.26). A change in the local wetland habitat above 100cm is signalled by peat development and a marked increase in Cyperaceae pollen, while the macrofossil content records patches of *Eleocharis* but little diversity in wetland species. No insect remains were recovered from this core.

3. NEW BEWICK – WEETWOOD (RIVER BREAMISH/TILL) REACH: SEDIMENTARY SEQUENCES

Bewick Bridge

Sedimentary sequences at Bewick Bridge were studied in sediment cores BT1 to BT10 (Figs 2.28 and 2.29). Sediment cores B3-4 and 6-8 found the terrace sediments to comprise an upper fine member of fining-upward well-sorted medium sands and massive silty sands up to 1.5m thick, overlying *c.*1.5m of bedded gravelly coarse-medium sand (Fig. 2.29). These sediments cap a basal coarse gravel member of indeterminate thickness that proved impenetrable by coring. The depth to contact with this gravel member varies between 2 and 3m across the valley floor (Fig. 2.29). Inset within the T1 valley fill on the west side of the valley are three well-preserved and highly sinuous palaeomeanders of the Breamish. All three channels were cored at the meander bend apex, respectively at sites BT1-2, 5 and 10 (Fig. 2.28) and found to be infilled with sandy, fine-grained organic-rich and/or peaty sediment sequences up to 3m thick (Fig. 2.29).

Age control for the abandonment of these channels is provided by ^{14}C samples taken at or near the base of the infill sequences (Fig. 2.29). The smallest and most northerly palaeochannel of the group was cored at BT5 where a peat sample between 160 and 170cm (BTcd-2) gave a date of *c.* cal AD 390–600 (SUERC-1159; Table B3). To the south of this channel the middle palaeomeander of the group was cored at site BT10 and yielded a peat sample between 95 and 110cm (BTcd-3) that dates to *c.* cal AD 680–940 (SUERC-1160; Table B3). The final palaeomeander of the group appears to truncate the southerly limb of the BT10 channel; here a peat sample at a depth of 200–214cm (BTcd-1) at site BT2 gave a date of *c.* cal AD 900–1160 (SUERC-1158; Table B3) and confirms the morphostratigraphic evidence of a younger age for this channel. In combination, these palaeochannels demonstrate localised shifts of the meandering gravel-bed Breamish channel during the first and early second millennium AD. There is no evidence of scroll-bar formation on the terrace surface inside the palaeomeanders and hence channel shifts were probably accomplished by avulsion during one or more flood events. Avulsion occurred in the context of a vertically stable channel bed elevation although overbank sedimentation of fine-grained alluvium will have aggraded the floodplain terrace surface during this period.

Newtown Bridge

Landform-sediment assemblages in the valley floor at Newtown Bridge were investigated by sediment cores BT13 to BT21 (Fig. 2.33). Cores BT13-15 and 16 were located on the terrace surface and revealed the valley fill to comprise a fine member of fining-upward bedded coarse sands, massive silty sand and sandy silt up to 2m thick that overlies an impenetrable coarse gravel member. Inset into the terrace surface on the east side of the valley floor is a well-preserved palaeochannel that gently meanders for some 700m on the eastern valley side, and an adjacent poorly-defined floodbasin depression (Fig. 2.33). Both the palaeochannel and floodbasin depressions are partially overprinted by ridge-and-furrow fieldsystems with furrow spacing at *c.*8–9m, and which are likely to date from medieval times or later.

The palaeochannel was cored at sites BT16-18 and BT20 and its infill sequence was found to comprise bedded and laminated sand and silt, and occasionally organic-rich clayey silts, that are up to 220cm thick (Fig. 2.33). Macrofossils of Salicaceae (sample BTcd-5a) and *Alnus glutinosa* (BTcd-5b) roundwood recovered from a level at the base of channel fill sediments in BT18 were AMS-^{14}C dated to *c.* cal AD 1470–1660 (GrA-23761) and *c.* cal AD 900–1040 (GrA-23763), respectively (Table B3; Fig. B5). Core BT20, located in the downvalley part of the same palaeochannel, recovered peaty silt between 175 and 190cm that was submitted for bulk ^{14}C assays on both the humin (BTcd-6) and humic acid (BTcd-6*) fractions; these yielded dates of *c.* cal AD 1330–1450 (GrN-28096) and *c.* cal AD 770–1160 (GrN-28097), respectively (Table B3). Both pairs of dates from this palaeochannel therefore gave statistically different ages, however, the older dates from each core lie within the same calibrated age-span of *c.* cal AD 770–1160 (Fig. B5). A younger (*c.* cal AD 1330–1660) age for channel abandonment is thought unlikely on the basis of archaeological evidence (see Chapter 2 for discussion) and hence it is provisionally assumed that this channel was abandoned shortly after *c.* cal AD 770–1160 (Appendix B).

Adjacent floodbasin sediments were cored at BT19 where a fining-upward, 200cm thick sequence of well-sorted sand, poorly sorted silty fine sand and

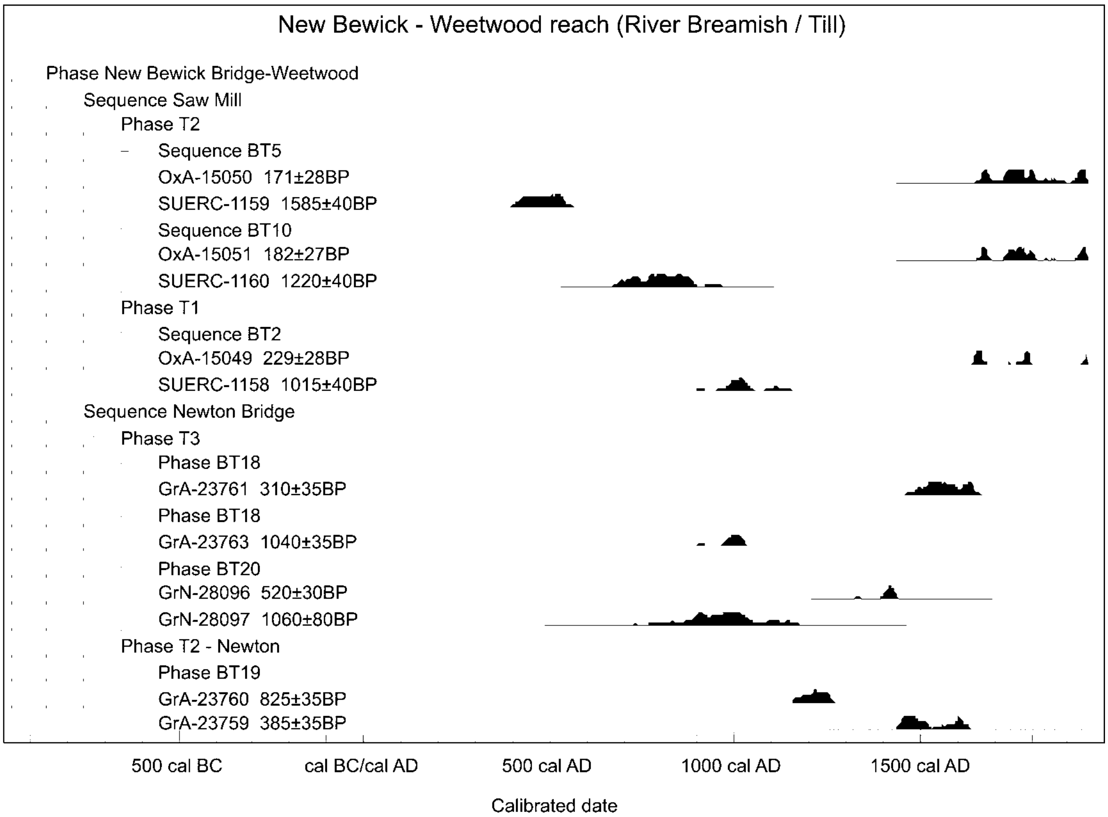


Fig. B5. Probability distributions of calibrated ^{14}C dates from New Bewick – Weetwood reach (River Breamish / Till).

silty clay was found to overlie impenetrable gravels (Fig. 2.33). The fine-grained channel fill contained occasional macrofossil inclusions including fragments of *Alnus glutinosa* and Salicaceae roundwood; samples of each were AMS-^{14}C dated at a level between 192 and 195cm (samples BTcd-4a and 4b, Table B3) and gave dates of *c.*cal AD 1430–1620 (GrA-23759) and *c.* cal AD 1160–1280 (GrA-23760; Table B3), respectively. While these dates also returned statistically differing age-spans, again the older date is preferred on the basis of archaeological evidence presented in Chapter 2. It is accepted, however, that both estimates may be too young, possibly as a result of contamination during coring and/or agricultural disturbance.

Chatton

Landform-sediment assemblages in a 2km sub-reach of the River Till extending downvalley from Chatton were investigated by sediment cores BT11-12 and BT22-26 (Fig. B6). Terrace T1 sediments were found to be characterised by a fine member up to 350cm thick, comprising fining-upward massive and occasionally poorly bedded sands, silts and clayey silt, which overlies an impenetrable coarse gravel unit of undetermined thickness. The terrace surface in this sub-reach features occasional poorly-defined palaeochannels of varying sinuosity and, on the margins of the Holocene valley floor, larger shallow depressions that are interpreted as floodbasin settings (Fig. B6). Floodbasin sediments were cored at sites BT12, 23 and 24 and found to comprise inorganic bedded and laminated sand, silt and occasionally clayey silt up to 280cm thick and overlying impenetrable gravels.

4. NEW BEWICK – WEETWOOD (RIVER BREAMISH/TILL) REACH: PALAEOECOLOGY OF ALLUVIAL SEQUENCES

Sediment core BT5 (Bewick Bridge)

Site BT5 is the oldest of three adjacent palaeochannels located on the main fluvial terrace surface of the Breamish near Bewick Bridge (Fig. 2.28). Channel fill sediments in this core reached a depth of 180cm and have been dated at 160–170cm to *c.* cal AD 390–600 (SUERC-1159); the upper part of the sequence at 43cm has been AMS ^{14}C dated to *c.* cal AD 1660–1955 (OxA-15050; Table B3, Fig. B5). The pollen diagram for this site spans 10–176cm (Figs 2.30 and B7) and can be differentiated into four assemblages that comprise two woodland and two open land phases;

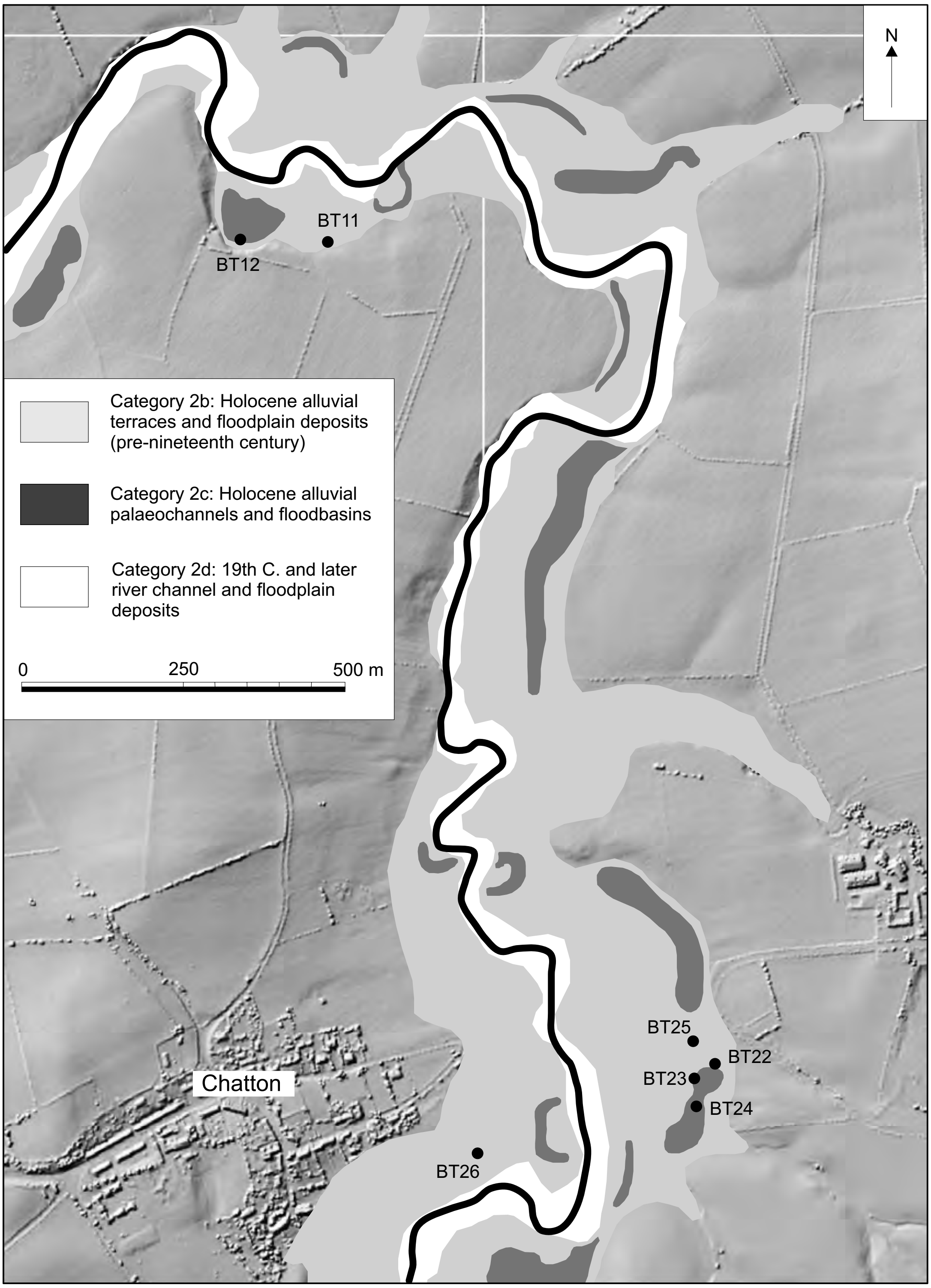


Fig. B6. Landform elements at Chatton (River Till) showing pre-19th C Holocene alluvial terraces and floodplain surfaces (Category 2b), major Holocene palaeochannels (Category 2c), 19th C and later alluvial surfaces (Category 2d) and sediment core locations.

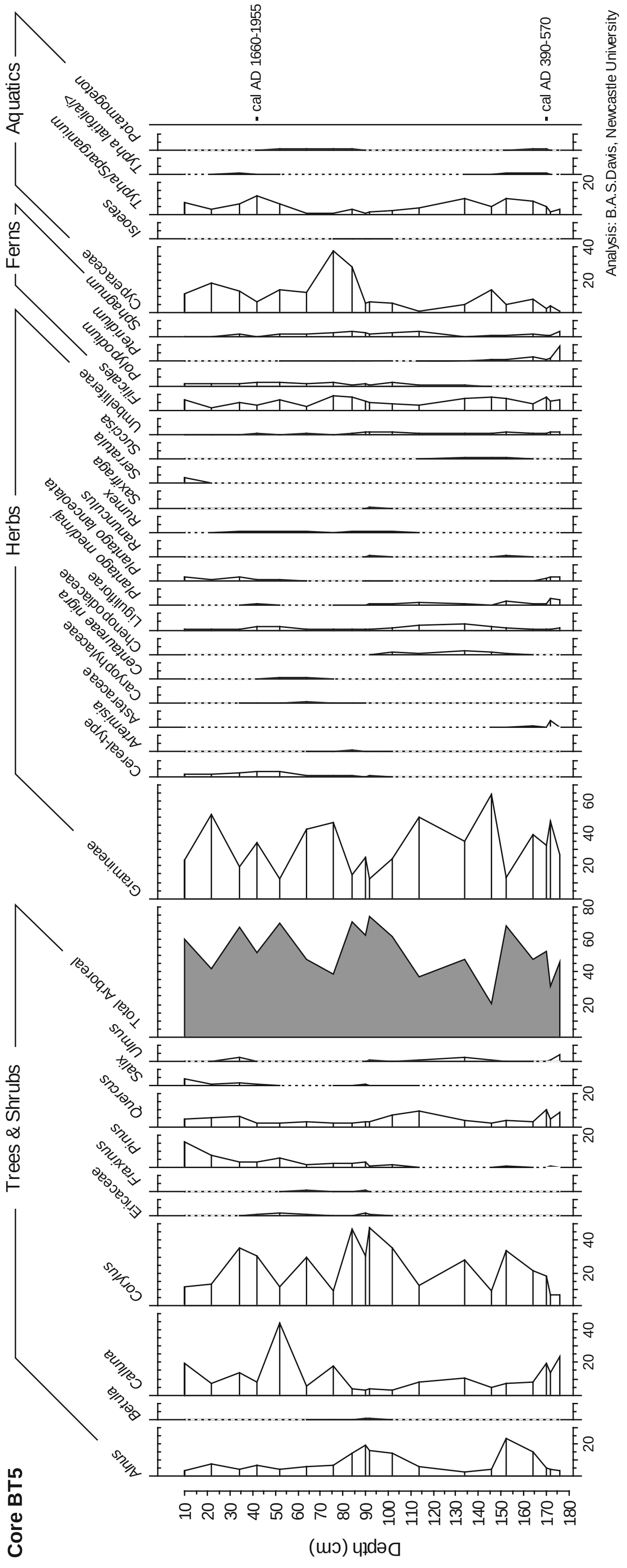


Fig. B7. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core BT5, Bewick Bridge, Breamish/Till valley.

Assemblage BT5-4 (10–80cm); Open grassland, cereals
Assemblage BT5-3 (80–108cm); Open woodland, *Alnus* & *Corylus*
Assemblage BT5-2 (108–149cm); Open grassland
Assemblage BT5-1 (149–176cm); Open woodland, *Alnus* & *Corylus*

The earliest (BT5-1, commencing *c.* cal AD 390 – 600) and middle phases (BT5-3) both reflect *Alnus-Corylus* woodland associations, representing periods of relatively well-developed forest cover and reduced open land in the vicinity of the contemporary floodplain (Fig. B7). *Alnus* favours damper ground and is tolerant of flooding while *Corylus* is a fast growing invasive primary coloniser, suggesting woodland expansion occurred across and near the floodplain on land still subject to episodic flooding and(or) poor drainage. Between these two woodland phases is a phase of more open and disturbed environment (BT5-2), suggested by an increase in both Gramineae and herbs such as Chenopodiaceae, Liguliflorae and *Plantago media/major*. This early open land phase is different from the later phase BT5-4 which is distinguished by fewer disturbance indicators and more anthropogenic indicators such as larger cereal-type Gramineae and *Plantago lanceolata*. Increases in *Calluna* and *Pinus* in this upper part of the sediment fill are also indicative of relatively dry or better-draining conditions, although this trend may well reflect greater representation of regional vegetation in the surrounding uplands if a general retreat of lowland woodland was occurring at this time. The increase in *Pinus* in the very uppermost part of the record (10–20cm, Fig. B7) may also reflect the marked expansion of pine plantations that has occurred over the last 100 years or so.

Lower levels of the BT5 sedimentary sequence (below 114cm) contain plant macrofossil species typical of those found in shallow ponded water (notably *Alisma plantago-aquatica*) and fringing wetlands (e.g. *Carex* spp.) (Fig. 2.30). The up-profile transition from laminated silts and sands to a silty peat at 110cm coincides with a significantly higher macrofossil count between 108–114cm with species found in waterlogged environments being well represented (e.g. *Carex* spp., *Epilobium hirsutum, Filipendula ulmaria* and *Ranunculus repens*). In the upper part of the sequence the macrofossil record is dominated by sedge seeds (*Carex* spp.) with a continuous presence of *Epilobium palustre*, a species which thrives in anaerobic, acid soils.

The overall trend in the macrofossil record charts the evolution of the cut-off from an ox-bow lake to a vegetated floodplain wetland, while the presence of grassland species within the samples and the absence of shade tolerant species or arboreal remains suggests that the floodplain in the immediate vicinity of the palaeochannel was relatively open with little or no woodland development (Fig. 2.30). Insect fauna remains within this sequence include *Aphodius* (dung beetle), *Sitona* ('clover' weevil) and *Gynemtron* ('plantain' weevil) which confirms the local presence of grassland and/or pasture (Fig. 2.30). Woodland signatures in the pollen record would therefore appear to reflect the wider floodplain and fringing terrace environment. The absence of a vegetation succession from floodplain wetland to floodplain woodland within the palaeochannel margins (*cf.* Amoros *et al.* 1987, Amoros and Wade 1996) might reflect anthropogenic disturbance such as animal grazing or mowing (Cotton 2001).

Sediment core BT10 (Bewick Bridge)

Site BT10 is located in a palaeochannel 125m distant from BT5 at Bewick Bridge (Fig. 2.28); here the sedimentary sequence is dominated by peat 110cm thick and has a basal date (between 95–110cm) of *c.* cal AD 680–940 (SUERC-1160; Figs 2.31 and B5; Table B3). The middle part of the sequence is AMS ^{14}C dated to c. cal AD 1650–1955 (OxA-15051; Table B3). Twelve pollen samples spanning 25–107cm were subjected to a full count and can be differentiated into two primary pollen assemblages (Figs 2.31 and B8):

Assemblage BT10-2 (25–86cm): Open grassland
Assemblage BT10-1 (86–107cm): Open woodland, *Corylus* & *Alnus* (*Calluna*)

The pollen sequence can be divided into an early phase (assemblage BT10-1) where woodland cover is relatively high at around 40% TTP, followed by deforestation and a later phase where woodland cover drops to less than 20% TTP, although with some recovery towards the top of the sequence (assemblage BT10-2; Figs 2.31 and B8). The early woodland is characterised by *Alnus* and *Corylus*, together with a significant amount of *Calluna* shrub indicative of acidic heathland on surrounding hillslopes. High counts of Gramineae and herbaceous pollen in this zone point to woodland disturbance, either through one, or a combination of flooding and human activity. Evidence of cultivation in close proximity to the site is more specifically supported around the junction of BT10-1 and BT10-2 (between 89 and 83cm), where a small increase in cereal-type pollen and *Rumex* occurs. This may indicate an intensification of agricultural activity that led to the clearance of woodland around the same time, and dates to the period immediately after *c.* cal AD 680–940. Direct evidence of cultivation does not persist into the upper phase BT10-2 although grasslands dominate throughout most of the remaining sequence. The increase in Umbelliferae at the top of the sequence may, however, suggest intensification in grazing, if not cultivation.

Plant macrofossil remains between 84 and 90cm evidence a substantial vegetation cover in and around the palaeochannel around *c.* cal AD 680–940 with the presence of both aquatic and wetland species indica-

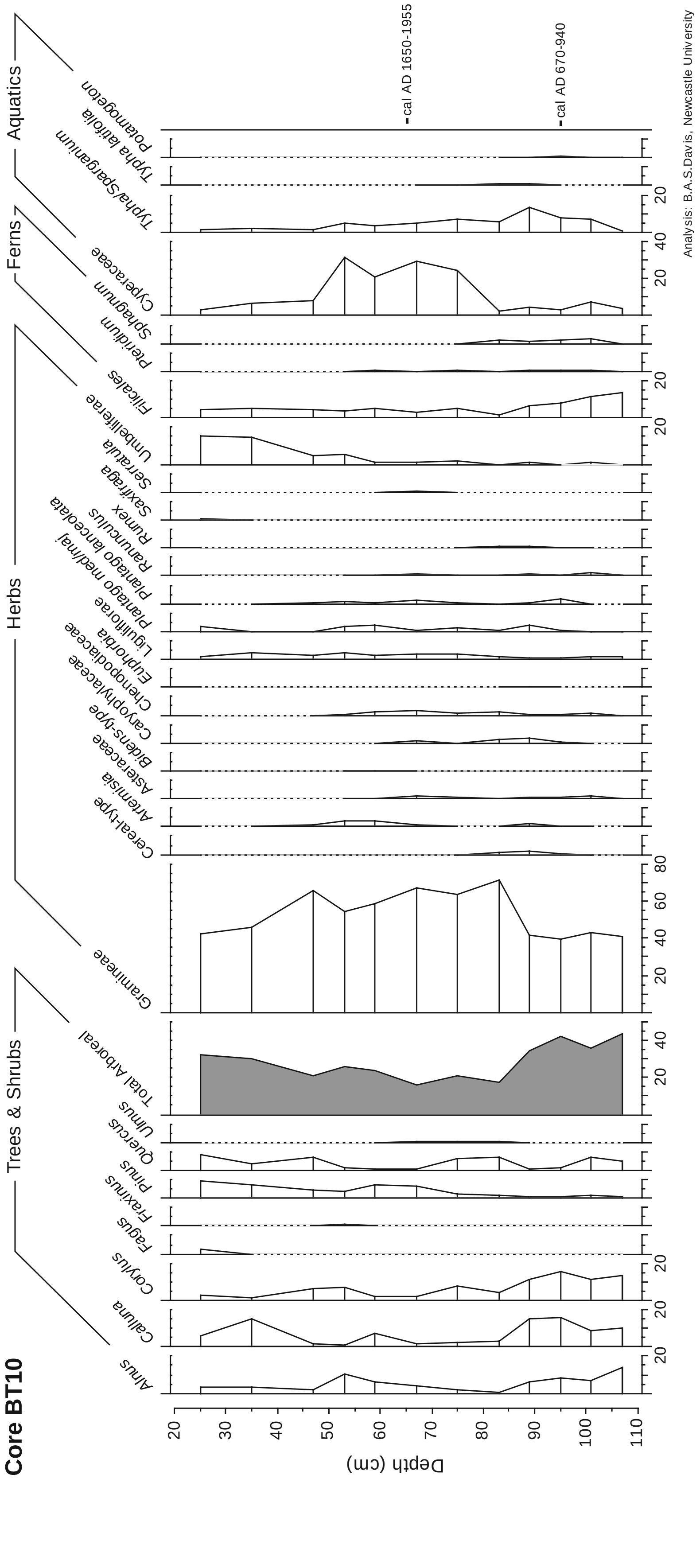


Fig. B8. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core BT10, Bewick Bridge, Breamish/Till valley.

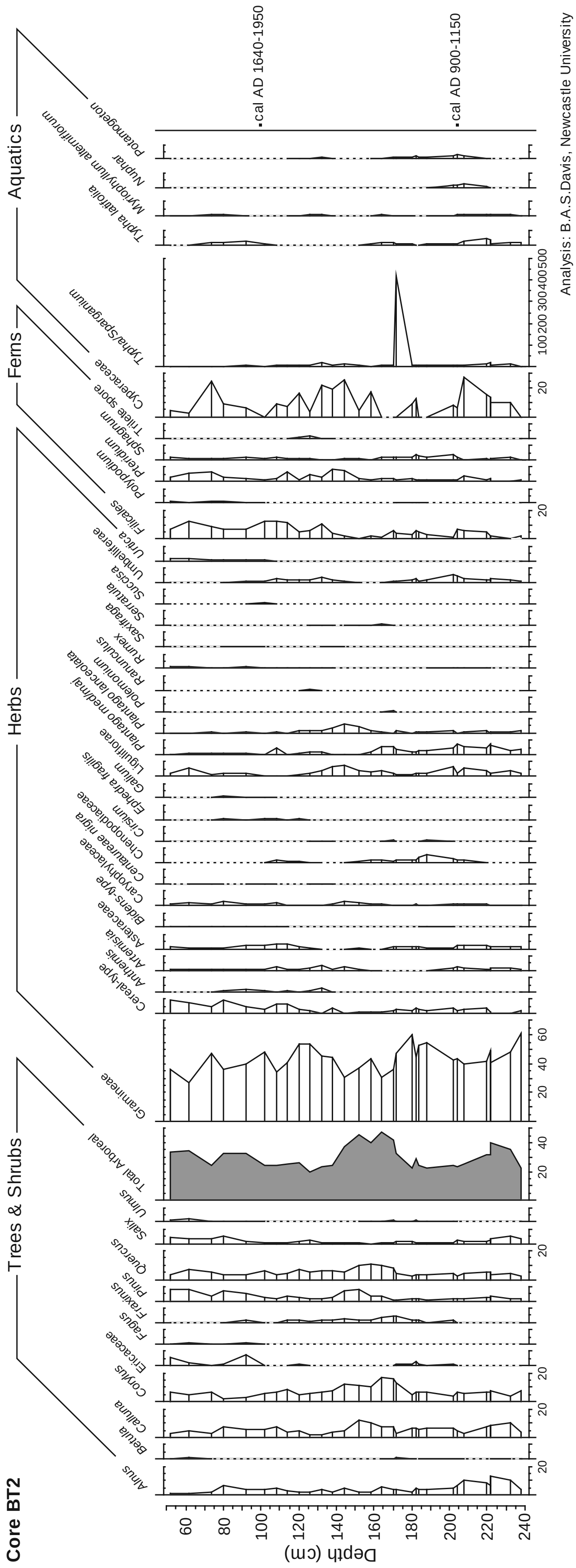


Fig. B9. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core BT2, Bewick Bridge, Breamish/Till valley.

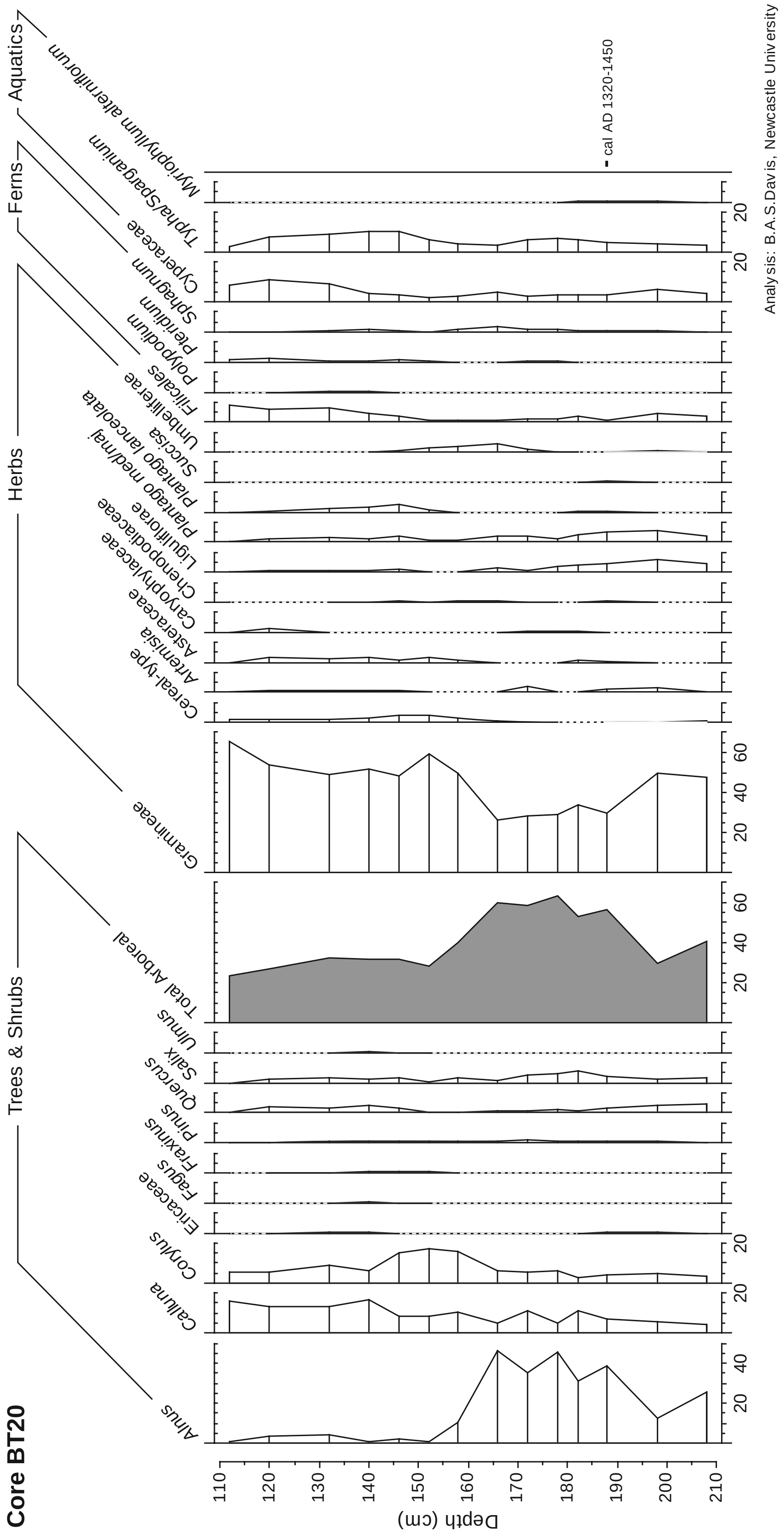


Fig. B10. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core BT20, Newtown Bridge, Till valley.

tive of a patchy wetland habitat with areas of standing water (Fig. 2.31). Peaty sediments above 84cm record the development of a marshy local environment with abundant *Carex* seeds suggestive of a sedge-dominated wetland habitat. This inference is consistent with the presence of insect species associated with wetland sedges and reeds (e.g. *Donacia*, *Notaris* and *Limnobaris*, Fig. 2.31).

Sediment core BT2 (Bewick Bridge)

Site BT2 is located in a palaeochannel 270m distant from BT10 and, on the basis of a date of *c.* cal AD 900–1160 (SUERC-1158) taken from near the base of the channel fill, is the youngest cut-off in the group of three dated channels at Bewick Bridge (Fig. 2.28; Table B3). Channel fill deposits at BT2 reach a depth of 266cm and have been subjected to full pollen analysis (totalling 30 samples) in organic-rich sediments between 52 and 238cm (Figs. 2.32 and B9). The pollen record can be differentiated into four broad assemblages as follows:

Assemblage BT2-1 (52–141cm): Open grassland, cereals
Assemblage BT2-2 (141–171cm): Open woodland, *Corylus*, *Quercus* (*Calluna*)
Assemblage BT2-3 (171–203cm): Open grassland, cereals
Assemblage BT2-4 (203–238cm): Open woodland, *Alnus*, *Quercus* (*Calluna*)

The onset of the vegetation record is marked by expansion of *Alnus-Corylus* woodland with values of arboreal pollen exceeding 40% (BT2-4, Figs. 2.32 and B9) and suggests that forest cover was an extensive, but probably not dominant feature of the landscape. *Calluna* pollen also occurs in relatively low (<15%) but still significant amounts, while the upper levels of this assemblage also sees the appearance of low (<7%) but significant amounts of cereal-type grains and associated ruderal pollen (including a small amount of *Rumex*). This phase of cultivation dates to *c.* cal AD 900–1160 (Figs 2.32 and B9) and was most probably focused on the adjacent gravel terraces to the east and west of the contemporary floodplain. Macrofossil records from the basal part of the sequence below 200cm include aquatic species that favour un-shaded, low energy open water (e.g. *Potamogeton*, *Alisma plantago-aquatica*) as well as cones from *Alnus glutinosa* and *Caltha palustris* seeds, a species common to damp alder woodlands (Fig. 2.32). The immediate palaeochannel environment at this time appears therefore to comprise an ox-bow lake with some encroachment of marginal wetlands and alder stands.

Sometime shortly after this period assemblage BT2-3 charts an increase in grassland, sustained cereal-type counts and a general diversification of the vegetation cover with the first appearance of many different tree and herb taxa. Macrofossil records during this phase indicate a continuation of mixed open water and wetland vegetation within the channel margins, while insect remains include dung beetles and weevils that are indicative of grassland and pasture in the locality (Fig. 2.32).

Pollen assemblage BT2-2, between 141 and 171cm, demonstrates a local recovery of woodland cover and a slight retraction of grassland, cereals and herbaceous taxa (Figs 2.32 and B9). Woodland composition during this phase is characterised by an expansion of *Quercus* while *Calluna* heath is a continuous presence on adjacent hillslopes. The change in dominant woodland taxa from *Alnus* to *Quercus* over assemblages BT2-4 and BT2-2 implies a shift from wetter to drier conditions since *Quercus* is much less tolerant of waterlogging and periodic flooding. Macrofossils, by contrast, indicate that local habitats within the palaeochannel margins remained a mix of patchy wetland with areas of open water (Fig. 2.32). However, the absence of *Potamogeton* between 1.40–1.45m may reflect the shrinking of standing water pools and the extension of a wetland habitat throughout the channel depression. This change is also marked in the insect record by the appearance of *Plateumaris* and *Doncia*, both of which prefer sedge and reed environments (Fig. 2.32).

In the upper part of the sedimentary sequence, between 141 and 52cm, the vegetation record is again marked by the expansion of grassland and cereals and a concomitant decline of woodland (assemblage BT2-1; Figs 2.32 and B9). An AMS ^{14}C date of *c.* cal AD 1640–1950 at 97cm (Table B3) suggests that this phase was most likely a post-medieval event. A small increase in Liguliflorae and *Plantago lanceolata* precedes the expansion of cereal-type pollen which is also accompanied by a low but persistent occurrence of *Rumex*. This last phase is therefore also interpreted as a period of clearance followed by relatively intense arable agriculture. Wetland habitats appear to persist in the palaeochannel itself and the presence of wetland species (*Sium latifolium* and *Potentilla palustris*) that are shade intolerant suggests the wetland margins were largely clear of woodland. Insect fauna above 105cm are again consistent with the local presence of grassland and pasture (Fig. 2.32).

Sediment core BT20 (Newtown Bridge)

Site BT20 is located in a palaeochannel on the main Holocene terrace of the River Till near Newton Bridge (Fig. 2.33). At this location organic-rich sediments dominate the lower part of the channel fill, between 100 and 220cm, and a provisional date of *c.* cal AD 770–1160 is assumed for the levels between 175 and 190cm (see above). Probability distributions for this date and basal dates from channel fills at Bewick Bridge would suggest that the Newtown Bridge cut-off was broadly contemporaneous with the abandonment of the BT2 channel some 3km upvalley (Fig. B5). The pollen record from BT20 spans fourteen samples between 112 and 208cm (Fig. 2.34 and B10) and can be differentiated into two primary assemblages:

Assemblage BT20-2 (112–162cm): Open grassland, cereals
Assemblage BT20-1 (162–208cm): Alder Carr

Percentages of *Alnus* reach almost 50% in assemblage BT20-1 (Fig. B10) and indicate that alder carr dominated the floodplain vegetation during the later medieval period. Alder carr is indicative of regular flooding and waterlogged ground, although pollen counts of aquatic species that favour permanently wet habitats, such as Cyperaceae and *Typha/Sparganium* are limited during this early woodland phase and suggest that areas of standing water were confined to local palaeochannel and floodbasin settings. This is confirmed by the macro-fossil record at this time since the presence of Daphnia ephippia, *Alisma plantago-aquatica*, Caddis fly larvae cases and *Potamogeton* spp. all indicate areas of open ponded water within the palaeochannel margins (Fig. 2.34). Macrofossils of alder in these levels also suggest the close proximity of floodplain alder stands.

The transition to pollen assemblage BT20-2 at around 162cm occurred sometime after *c.* cal AD 770–1160 and signals a major local woodland clearance phase with arboreal pollen counts dropping from around 65% to 25% TTP (Fig. B10). This change is associated with a marked expansion of Gramineae and an increase in cereal-type pollen which suggests that clearance occurred for agricultural purposes, including arable farming. The disappearance of alder macrofossils from sediments above 160cm is consistent with a retraction of floodplain tree cover, while a mixed assemblage of seeds from aquatic and wetland plants in these levels points to the development of a wetland habitat with areas of standing water in the channel depression (Fig. 2.34). Insect remains including *Donacia Limnobaris* and *Notaris* species in these levels are also indicative of the local presence of sedges and burr reeds, while the proximity of grassland and pasture is also suggested by the presence of *Aphodius (*dung beetle*), Sitona* and *Apion* 'clover' weevils and *Alophus triguttatus* (Fig. 2.34).

Appendix C

Supplementary Details of Sedimentary Sequences and Palaeoecological Analyses Recorded on Holocene Alluvial Landform Elements in the Milfield Basin (Rivers Till and Glen)

1. PALAEOECOLOGY OF ALLUVIAL SEDIMENT CORES FROM THE WEETWOOD-EWART-DODDINGTON AREA (RIVER TILL)

Pollen analysis was undertaken on four sediment cores in the central part of the Milfield Basin, respectively at MSH1-19, MSH1-21, Mil119-9 and Mil108-2 (Fig. C1).

Sediment core MSH1-19

The pollen diagram for MSH-1-19 spans organic-rich sediments between 397 and 200cm (Figs 2.39 and C2) and has been classified into four local pollen assemblage zones:

- Assemblage MSH1-19 (I) (397–342cm): Mixed oak woodland and floodplain alder, small-scale clearance with pasture, cereals above 365cm.
- Assemblage MSH1-19 (II) (342–302cm): Mixed oak woodland, some floodplain alder, small-scale clearance with pasture and cereals.
- Assemblage MSH1-19 (III) (302–240cm): Open woodland, grassland with pasture and cereals, floodplain alder above 260cm.
- Assemblage MSH1-19 (IV) (240–200cm): Open woodland, extensive grassland with pasture and cereals.

Peaty organic matter at the base of the sequence between 395 and 397cm has been dated on both the humic acid (SUERC-518) and humin acid (SUERC-519) fractions to *c.* cal 4050–3950 cal BC (Table C1 and Fig. C3), and this also provides the age control for the beginning of the pollen sequence represented by assemblage MSH1-19 (I). This assemblage is dominated by arboreal pollen at 85–90% of the total land pollen (Fig. C2); drier parts of the alluvial surface and adjacent Lateglacial sand and gravel terraces appear to have supported a mixed oak woodland cover with elm, lime and ash. It is likely that hazel occurred both as a component of the oak forest and in hazel-dominated forest stands on the upstanding terraces. Lower elevation parts of the floodplain in the vicinity of the palaeochannel supported thick alder carr. A decline in arboreal pollen counts above 360cm is countered by an increase in alder as well as Poaceae and several anthropogenic indicators (e.g. *Plantago lanceolata*, *Papaver*, *Melilotus*, *Rumex acetosa/acetosella*) while cereal type pollen is first encountered at 356cm (Fig. C2). This trend suggest small-scale thinning of the mixed oak woodland cover and the establishment of small arable plots in the vicinity of the core site, most probably located on the adjacent sand and gravel terrace to the west. Available dating controls would suggest that this activity was occurring shortly after the beginning of the Neolithic period.

The transition to assemblage MSH1-19 (II) at 342cm is characterised by a rise in non-arboreal pollen percentages from 15 to 30% (Fig. C2). This change sees an increase in the diversity of herbaceous flora, including elevated values of Poaceae, Cerealia and *Plantago*, primarily at the expense of *Alnus glutinosa* and, in the upper levels of the zone, *Tilia*. These changes in the arboreal flora can be explained by the partial clearance of the alder woodland on wetter parts of the alluvial surface while the mixed oak forest cover on drier parts of the valley floor was broadly maintained. Dating this phase of clearance activity must await further investigations.

Assemblage MSH1-19 (III) begins at 302cm with a marked decline in arboreal pollen from 70 to 32% of the total land pollen (Fig. C2). This clearance phase is evident in all tree species and is countered by a steep rise in Poaceae. Cereal pollen attains a value of 5% in this assemblage and *Secale cereale* is also detected, while intensive human occupation in the vicinity of the site is inferred by a peak in *Plantago lanceolata* and *Pteridium* pollen (4–5%; Fig. C2). This marked intensi-

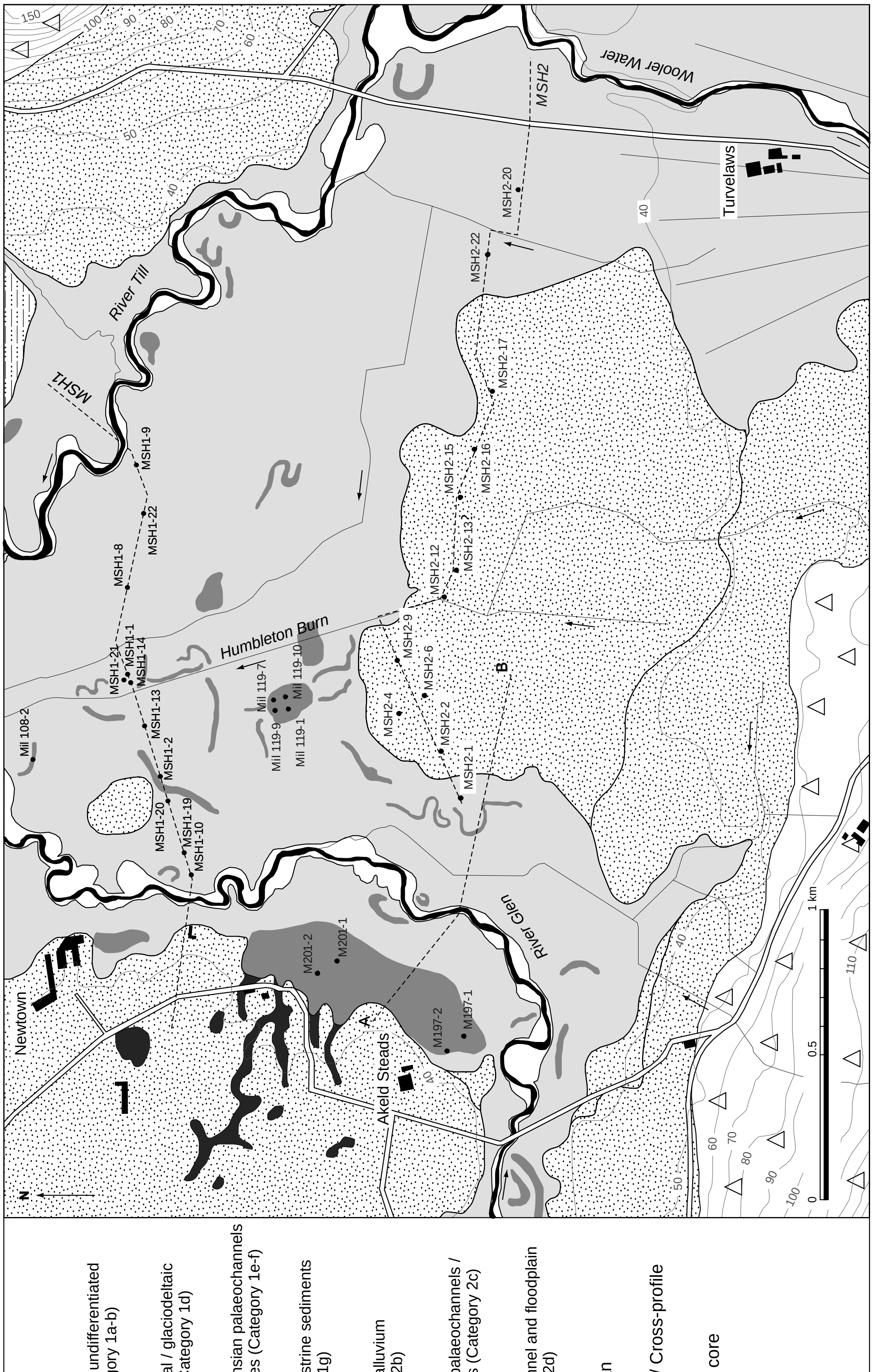


Fig. C1. Map of the Milfield Basin showing Holocene alluvial landform elements (Categories 2b-d) and locations of coring transects and sediment cores.

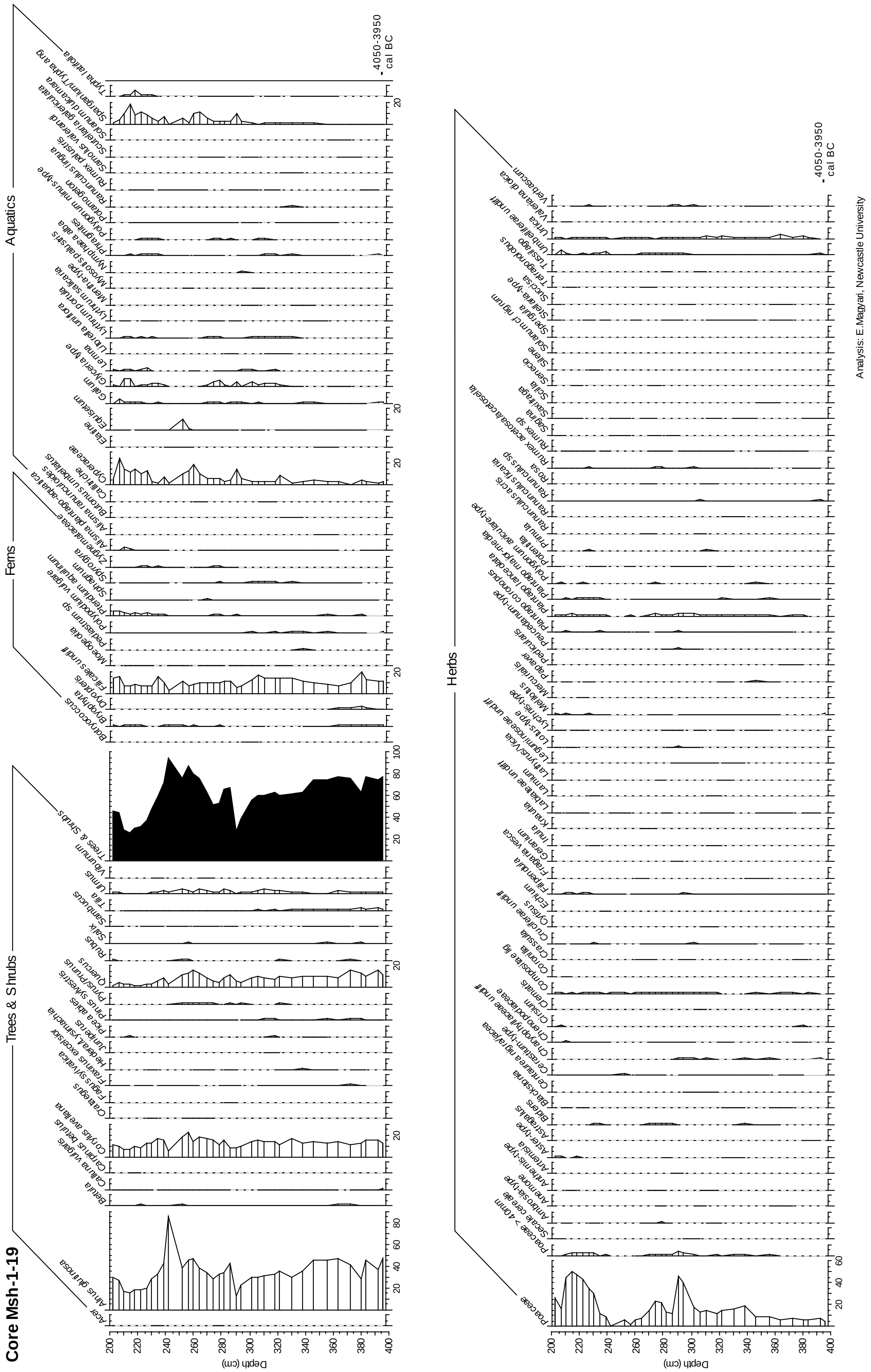


Fig. C2. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core MSH1-19, Milfield Basin.

Laboratory code	Sample reference	Core	Material	δ13C (‰)	14C Age (BP)	Weighted mean	Calibrated date range (95% confidence)
AA-53194	M1 (0.88–0.90m)	Mil 171-4	humic acid	-28.1	2830±45	2880± 32 BP T′=2.5; v=1; T′(5%) =3.8	1200–930 cal BC
AA-53195	M1 (0.88–-0.90m)	Mil 171-4	humin	-28.6	2930±35		
AA-53196	M2 (1.88—1.90m)	Mil 171-5	humic acid	-28.1	3255±45		1630–1430 cal BC
AA-53200	M6 (2.48–2.50m)	Mil 119-9	humic acid	-27.9	5105±45	5093± 35 BP T′=0.2; v=1; T′(5%) =3.8	3970–3790 cal BC
AA-53201	M6 (2.48–2.50m)	Mil 119-9	humin	-28.5	5075±55		
SUERC-512	M8 (2.38—2.40m)	Mil 102-2	humic acid	-28.5	2185±45	T′=1038.8; v=1; T′(5%) =3.8	390–100 cal BC
SUERC-517	M8 (2.38–2.40m)	Mil 102-2	humin	-27.6	4545±60		3500–3020 cal BC
SUERC-520	M9 (1.63–1.65m)	MSH 2-22	humic acid	-30.6	1770±45	1711± 32 BP T′=3.6; v=1; T′(5%) =3.8	cal AD 240–420
SUERC-521	M9 (1.63–1.65m)	MSH 2-22	humin	-29.9	1650±45		
SUERC-510	M11 (2.17–2.18m)	Mil 108-2	humic acid	-31.1	1850±65	1826± 37 BP T′=0.2; v=1; T′(5%) =3.8	cal AD 80–320
SUERC-511	M11 (2.17–2.18m)	Mil 108-2	humin	-28.8	1815±45		
SUERC-518	M12 (3.95–-3.97m)	Msh 1-19	humic acid	-29.9	5180±50	5183± 35 BP T′=0.0; v=1; T′(5%) =3.8	4050–3950 cal BC
SUERC-519	M12 (3.95–3.97m)	Msh 1-19	humin	-29.4	5185±50		
SUERC-522	M13 (3.21–3.23m)	Msh 1-21	twig	-27.0	4700±55		3640–-3360 cal BC
Radiocarbon dates from Passmore *et al.* 2002; Passmore and Houghton, unpublished data							
Beta-119826	Doddington (1.4–1.5m)	Mil-8	silty peat		3810±70		2470–2030 cal BC
Beta-119827	Redscar Bridge (1.70–1.78m)	Mil-15	silty peat		840±60		cal AD 1030–1280
Beta-118928	Thirlings (2.30–2.36m)	Mil-22	silty peat		3580±60		2130–1740 cal BC
Beta-119829	Thirlings (1.30–1.38m)	Mil-23	silty peat		8470±70		7600–7370 cal BC
Beta-125959	Humbleton Burn (2.91–2.99m)	MSH1-14	silty peat		11,740±70		11,810–11,470 cal BC

Table C1. ^{14}C dates from the Milfield Basin (River Till).

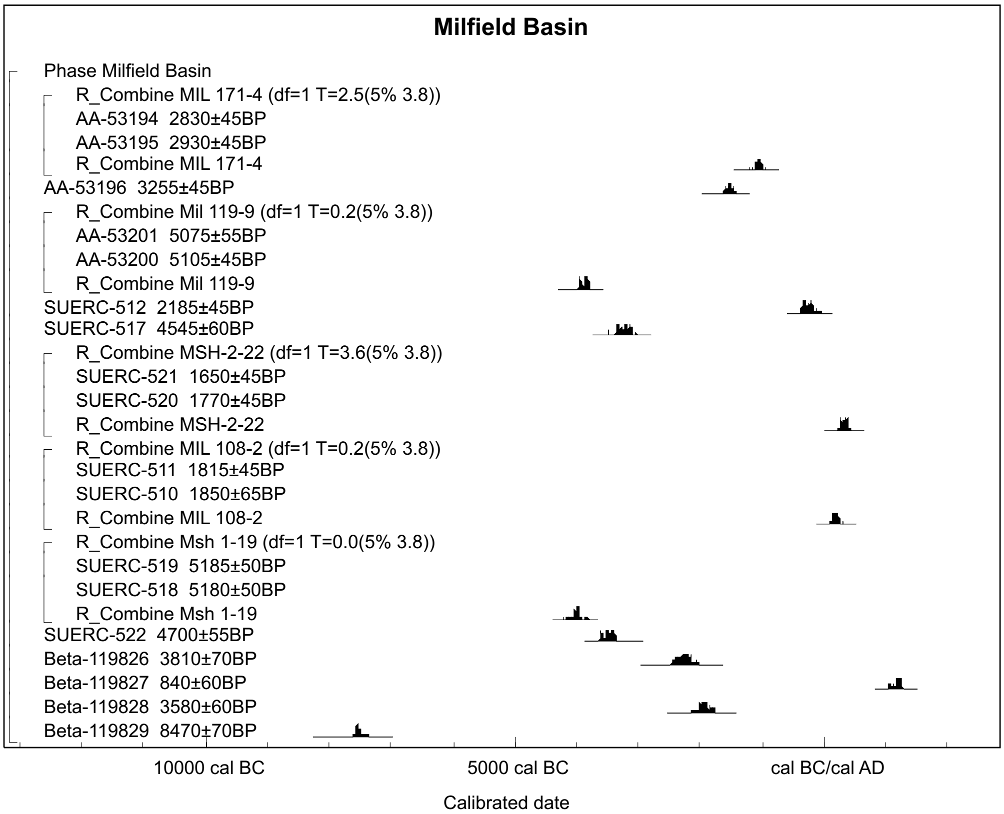


Fig. C3. Probability distributions of calibrated ^{14}C dates from the Milfield Basin (River Till)

fication of land use is not yet dated at MSH1-19, but may well coincide with the Late Neolithic activities recorded in the Milfield Basin, including widespread construction of ritual monuments on the upstanding sand and gravel terraces of the valley floor (see Chapters 4–5). It appears, however, to have been relatively short-lived since the upper part of the assemblage sees a return to high arboreal pollen counts, particularly *Alnus glutinosa*, and diminished anthropogenic indicators (Fig. C2). Development of alder carr in the upper levels of this assemblage have strongly suppressed other land pollen values.

The onset of assemblage MSH1-19 (IV) at 240cm is marked by a steep but gradual decrease in arboreal pollen (especially *Alnus*) from 90 to 20% (Fig. C2). This trend sees a corresponding increase in Poaceae and other herbaceous taxa, including *Pteridium aquilinum Plantago lanceolata*, *Filipendula*, Umbelliferae undiff., Chenopodiaceae and *Melilotus*, which are consistent with localised livestock grazing, hay cutting and arable farming. Human activities reflected in this assemblage appear to have been more intensive and of longer duration than those recorded earlier in the sequence, but they also give way to a partial resurgence in woodland cover at the top of the pollen sequence (Fig. C2). At present, however, the chronology of these phases is the subject of further investigation.

Sediment core MSH1-21

The pollen assemblage from sediment core MSH1-21 spans organic-rich sediment between 310 and 330cm (Fig. 2.38) and is characterised by high values of Poaceae (30–40% of total land pollen), *Filipendula* and Cyperaceae (Fig. C4). Arboreal pollen is limited to a presence of *Corylus*, *Betula* (including the arctic-alpine dwarf-shrub *Betula nana* L.) and *Juniperus*. This vegetation assemblage is typical of hazel-birch-juniper scrub and open grasses that have been recorded in very early Holocene pollen diagrams elsewhere in northern Britain (e.g. Innes and Shennan 1991), including lateglacial kettle hole fill deposits at Lilburn South Steads, 9.7km to the south-east (Jones *et al*. 2000). However, MSH1-21 has been dated at 322cm to *c*.3640–3360 cal BC at 322cm (SUERC-522; Table C1), although this date is believed to be in error as a result of sample contamination during the coring exercise. Accordingly the interpretation of a lateglacial or early Holocene context for this deposit remains provisional, pending further palaeoecological and radiocarbon analysis.

Sediment core Mil119-9

Pollen analysis of sediment core Mil119-9 focused on peat and organic-rich silts and clays between 225 and

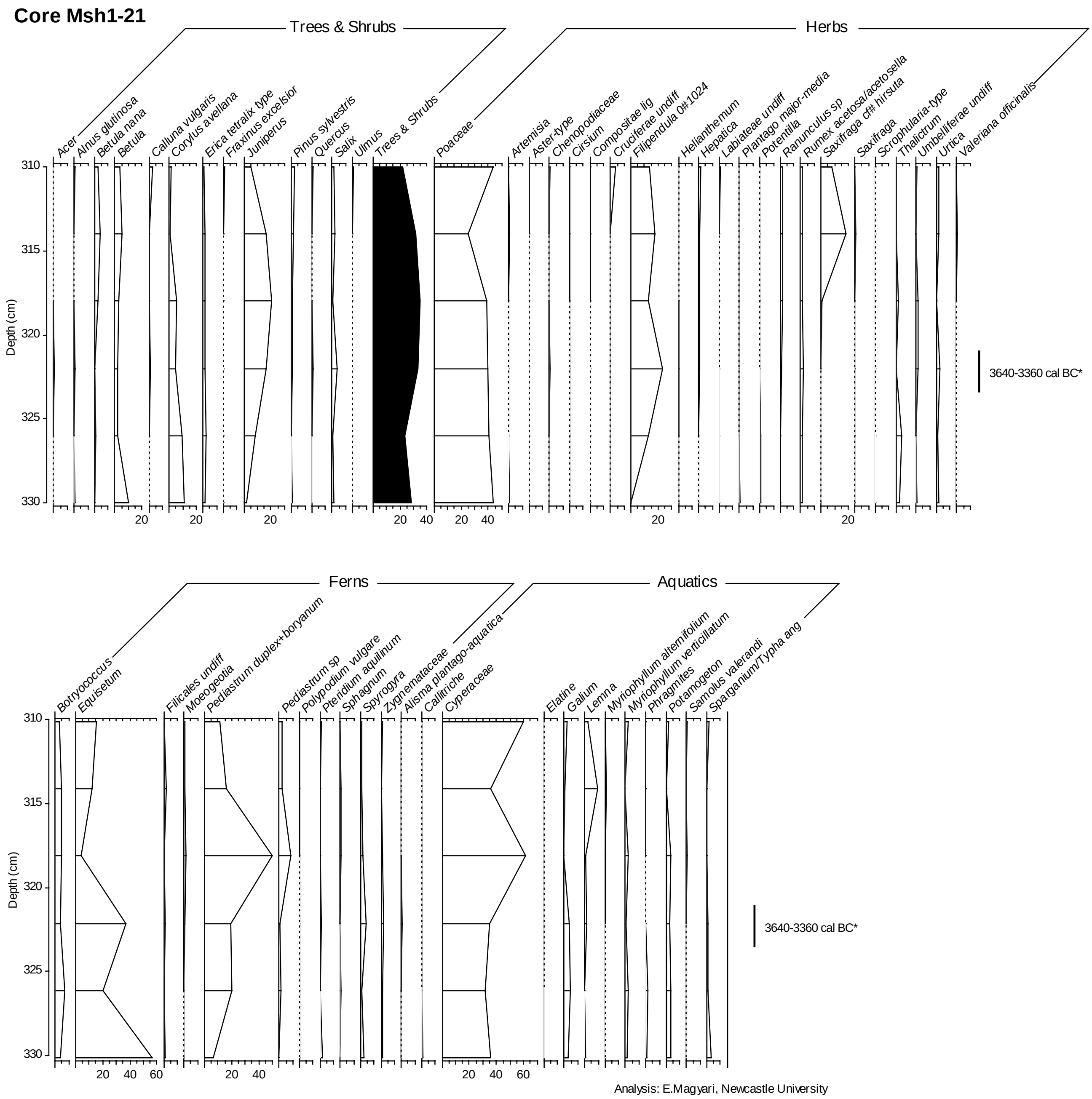


Fig. C4. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core MSH1-21, Milfield Basin (see text and Chapter 2 for discussion of ^{14}C date reliability).*

275cm; dating control on this sequence is derived from peats between 248 and 250cm that have been dated on both the humic acid (AA-53200) and humin acid (AA-53201) fractions to *c*.3970–3790 cal BC (Table C1 and Fig C3). Pollen records have been differentiated into two assemblages (Fig. C5):

- Assemblage Mil119-9 (I) (275–260cm): Hazel woodland with some pine, oak and willow, floodplain alder, small-scale pasture and cereals.
- Assemblage Mil119-9 (II) (260–225cm): Alder carr, mixed oak/hazel woodland, small-scale pasture.

Assemblage Mil119-9 (I), deposited before *c*.3970–3790 cal BC, is characterised by high arboreal pollen counts (>70% total land pollen) that are dominated by *Corylus* with a component of *Pinus*, *Quercus*, *Salix* and a trace of *Tilia* and *Ulmus* (Fig. C5). Grasses (Poaceae), ruderal pollen and a cereal grain from this assemblage are indicative of small-scale clearance that may have been associated with Early Neolithic human activity rather than flood disturbance, and possibly included a short-lived episode of arable cultivation.

A marked expansion of *Alnus glutinosa* in the upper Assemblage Mil119-9 (II) signals the development of alder carr in the vicinity of the floodplain wetland (Fig. C5) and this may have acted to partially screen the local pollen rain into the core site. However, elevated values of *Quercus*, *Ulmus* and *Tilia* and a continued presence of Corylus point to the local maintenance of mixed oak/hazel woodland during the Early Neolithic period. Human activity during this phase is evidenced by elevated values of Poaceae and ruderal pollen that are probably indicative of small-scale clearance and pastoral land-use.

Sediment core Mil108-2

Sediment core Mil108-2, located in a palaeochannel in the lower reaches of the River Glen (Fig. C1), provides the youngest alluvial pollen assemblage from this part of the Milfield Basin; a radiocarbon date of *c.* cal AD 80–320 was obtained from the humic (SUERC-510) and humin acid (SUERC-511) fractions of bulk organic sediment at 220cm (Table C1 and Fig. C3) and provides a maximum age for a single pollen assemblage spanning 192–152cm (Fig. 2.38 and Fig. C6). The pollen diagram is dominated throughout by Poaceae, ruderal taxa (including *Plantago lanceolata, P. major/media*, and A*nthemis*-type) and cereals (*Secale cereale*) that are indicative of hay meadows, pasture and arable plots in the vicinity of the core site. Arboreal pollen counts are low and consistent with a scattered woodland presence including alder, hazel and oak. A continuous presence of heather pollen (*Calluna vulgaris*) is most probably derived from heathland in the nearby Cheviot uplands.

2. PALAEOECOLOGY OF ALLUVIAL SEDIMENTARY SEQUENCES IN THE RIVER GLEN

Pollen analysis was undertaken on four sediment cores in the valley of the River Glen between Lanton and Akeld, respectively at M256-1, M253-1, M253-3 and M258-1 (Figs 2.41 and 2.43).

Sediment core M256-1 (River Glen)

The pollen diagram for core M256-1 (Fig. C7) spans peat and organic-rich sediment between 212 and 76cm and has been differentiated into two pollen assemblages:

- Assemblage M256-1 (II) (125–76cm); Open grassland, some woodland cover (*Alnus* & *Corylus)*, pasture and cereals.
- Assemblage M256-1 (I) (212–125cm); Open grassland, pasture, cereals.

Assemblage M256-1 (I) is dated at the base of the sequence to *c.* cal AD 1400–1460 (AA-53202; Table C2 and Fig. C8) and is dominated by herbaceous taxa (85–90% of total land pollen, including *Pteridium aquilinum*), particularly Poaceae and Brassicaceae. The vast majority of the herbaceous flora can be regarded as anthropogenic indicators (Behre 1982), including *Plantago lanceolata, P. major/media*, *Rumex acetosella*, *Anthemis*-type, *Taraxacum*-type and Apiaceae. Cereal pollen attains 5–15% of the total land pollen with a peak in *Secale cereale* (rye) pollen in the bottom sample (212cm). The occurrence of *Centaurea cyanus* and *Consolida regalis* in several samples above 182cm is also indicative of the presence of crop fields. Arboreal pollen accounts for less than 20% of the pollen assemblage and reflects scatters of mainly hazel and birch with patches of alder along riverbanks and fringing floodplain wetlands. A continuous presence of heather pollen (*Calluna vulgaris*) is most probably derived from heathland in the nearby Cheviot uplands.

A number of species that prefer shallow standing water characterise the wetland pollen taxa at the base of the sequence between 212 and 180cm (e.g. *Equisetum* cf. *fluviatile, Spyrogyra*, *Moeogeotia*, Zygnemataceae, *Pediastrum boryanum* and *Myriophyllum alternifolium*) and coincide with accumulation of peat in this part of the sediment core. The stratigraphic change to peaty silt above 180cm sees a sharp decline in *Equisetum fluviatile* (water horsetail) and a corresponding rise in Filicales spores and Cyperaceae, reflecting the expansion of fen communities rich in ferns and sedges around the floodplain lake margins.

Sediment core M253-1 (River Glen)

Sediment core M253-1 is located some 700m downvalley from M256-1 and has a fine-grained channel fill sequence 95cm thick (Fig. 2.43). A date of *c.* cal AD 1410–1620 (AA-53197; Table C2) at the base of this sequence has a strongly overlapping date range with that of the basal assay from M256-1 (Table C2; Fig. C8) and suggests that these channels, and at least the early part of their sedimentary fill, are broadly contemporary. The pollen diagram from M253-1 spans sediments between 50 and 95cm and comprises a single assemblage that is characteristic of a largely open landscape of grassland and arable plots with some scattered woodland cover (primarily alder, hazel and willow) (Fig. C9). This assemblage shows a great similarity to M256-1 (II) although higher counts of *Salix* and a lower abundance of *Calluna vulgaris* is evident in M253-1. A further notable feature of this sequence is the presence of *Carpinus betulus* pollen at 52cm (Fig. C9) which most likely indicates the occurrence of planted hornbeam in the region during late medieval times.

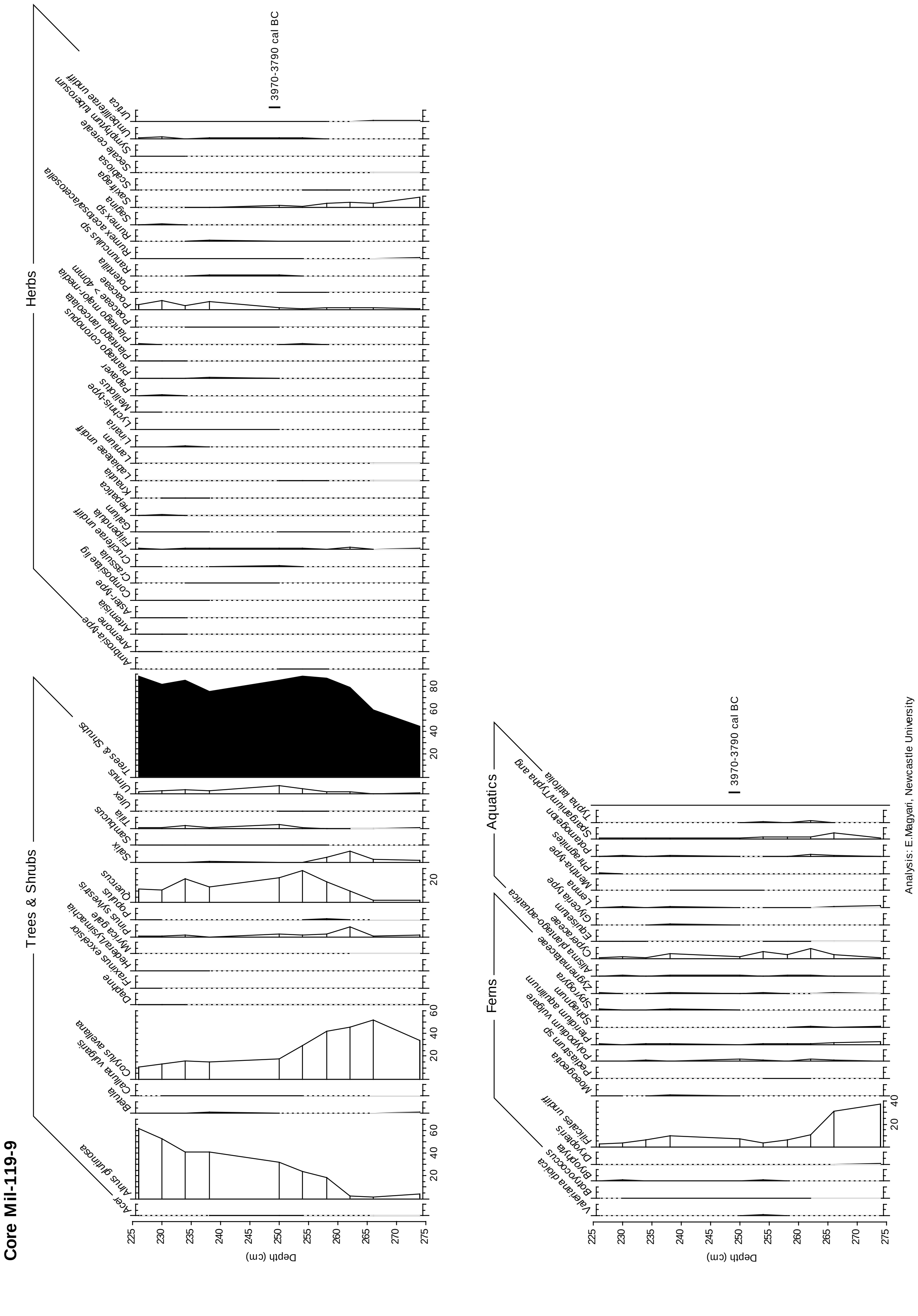


Fig. C5. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core Mil 119-9, Milfield Basin.

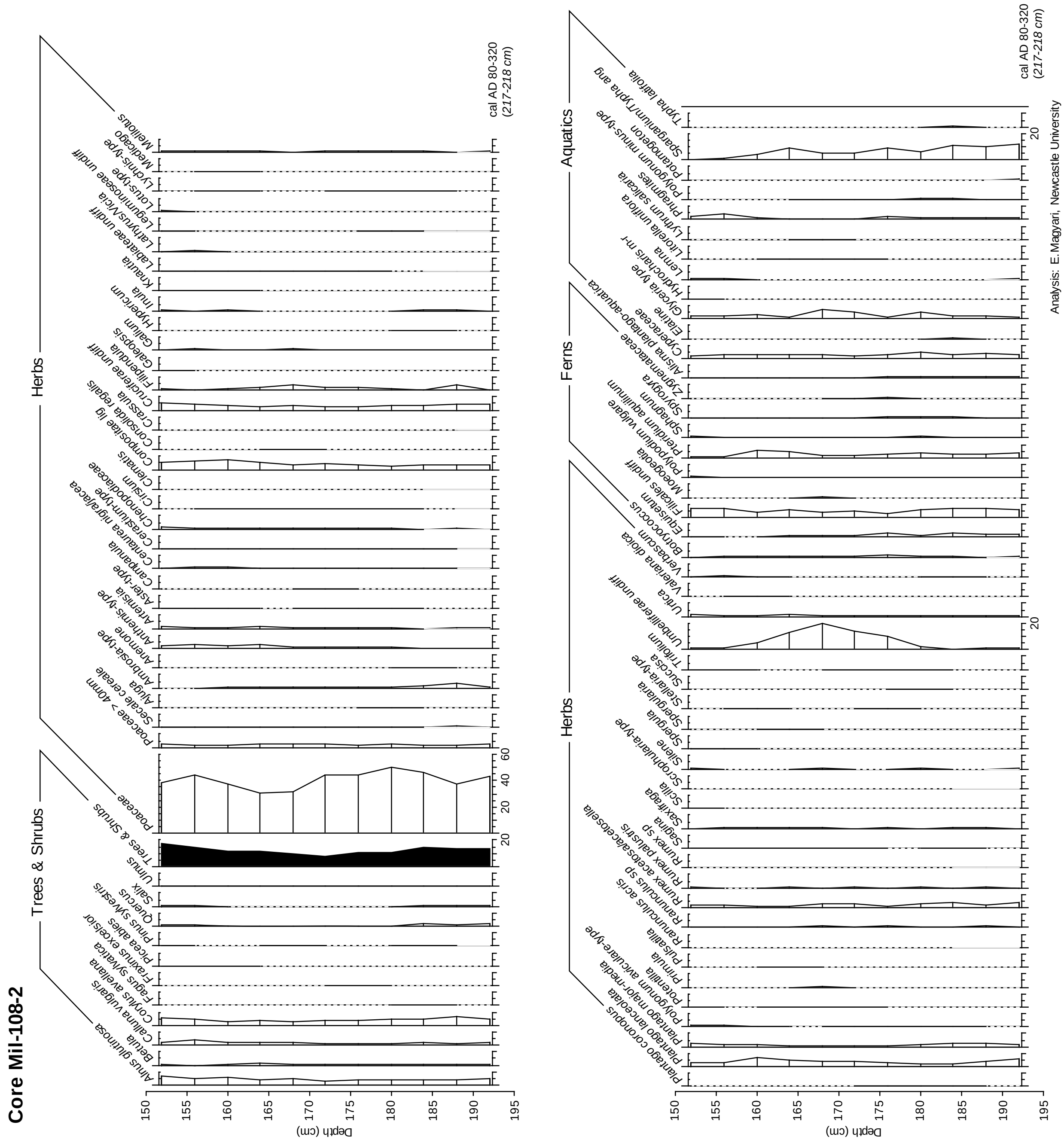


Fig. C6. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core Mil 108-2, Milfield Basin.

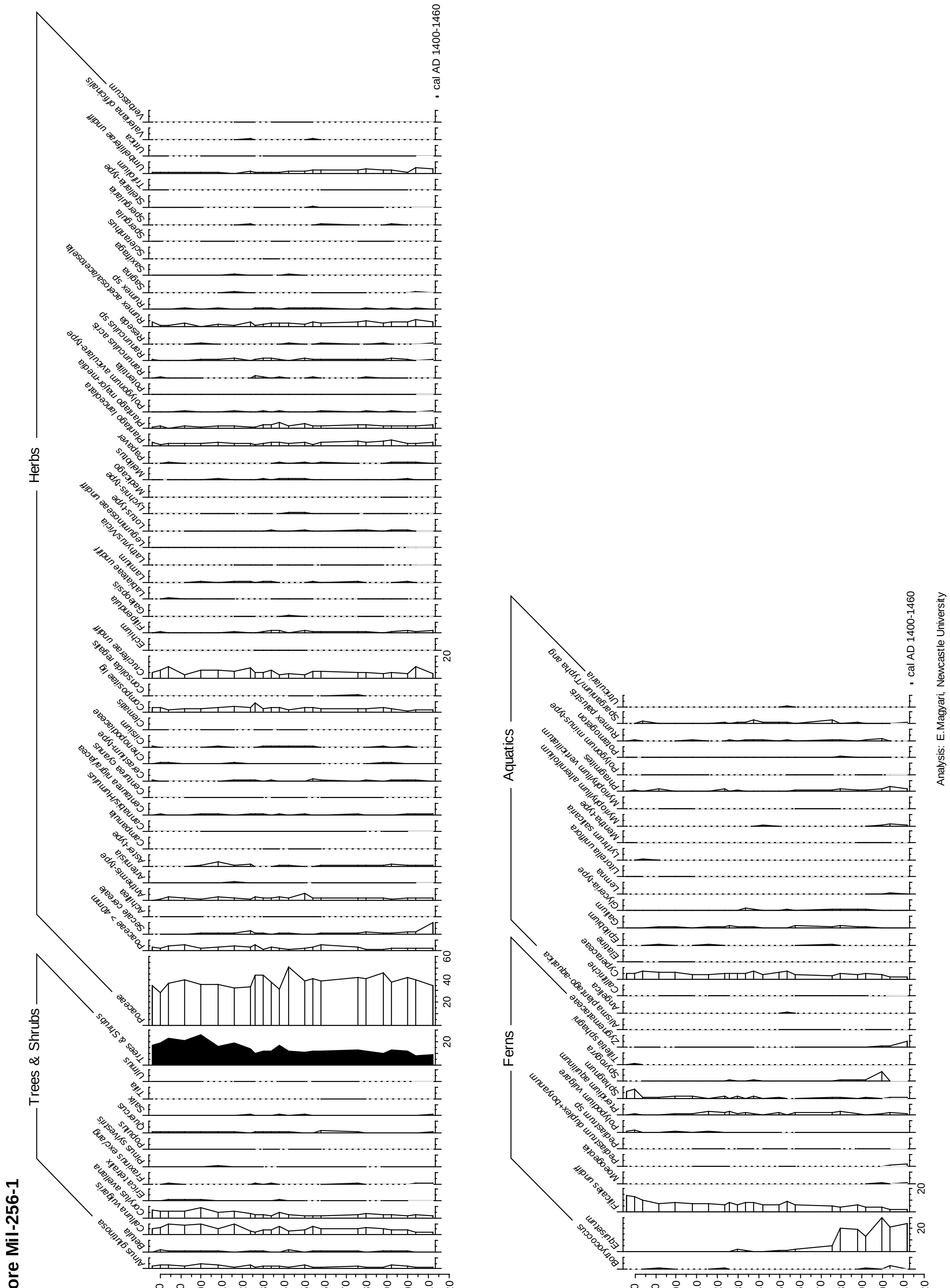


Fig. C7. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core M256-1, River Glen.

Laboratory code	Sample reference	Core	Material	δ13C (‰)	14C Age (BP)	Calibrated date range (95% confidence)
AA-53197	M3 (0.93–0.95m)	Mil 253-1	humic acid	-28.7	440±40	cal AD 1410–1620
AA-53198	M4 (0.68–0.70m)	Mil 253-3	humic acid	-28.8	285±40	cal AD 1480–1800
AA-53199	M5 (1.00–1.02m)	Mil 258-1	humic acid	-28.8	365±40	cal AD 1440–1650
AA-53202	M7 (2.13–2.15m)	Mil 256-1	humic acid	-28.7	475±35	cal AD 1400–1460

Table C2. 14C dates from the River Glen.

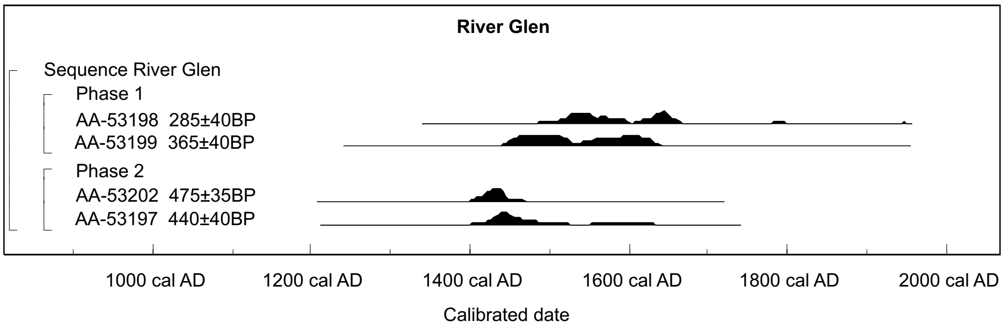


Fig. C8. Probability distributions of calibrated 14C dates from the River Glen.

Sediment core M253-3 (River Glen)

Sediment core M253-3 is located less than 200m north-east of M253-1 (Fig. 2.41) and samples a palaeochannel fill 150cm thick (Fig. 2.43). A single pollen assemblage from this core spans organic-rich sediments between 75 and 30cm (Fig. C10) and is dated at the base of the sequence to *c*. cal AD 1480–1800 (AA-53198; Table C2 and Fig. C8). The pollen diagram is broadly similar to those for sediment cores M256-1 and M253-1 (see above), being characterised by an open landscape with grassland, pasture and cereal plots. Arboreal pollen frequencies in this assemblage are typically less than 15% in most levels and are the lowest of the four River Glen sediment cores analysed here. The presence of *Pisum sativum* pollen at 48cm may be indicative of the cultivation of wild pea, while this assemblage also features the presence of *Carpinus betulus* (hornbeam) pollen at 36cm.

Sediment core M258-1 (River Glen)

Sediment core M258-1 lies 200m east of M256-1 (Fig. 2.41) and reveals a relatively shallow palaeochannel fill 105cm thick (Fig. 2.43). A single pollen assemblage from this core spans organic-rich sediments between 50 and 105cm (Fig. C11) and is dated at the base of the sequence to *c*. cal AD 1440–1650 (AA-53199; Table C2 and Fig. C8). The pollen composition of this core is very similar to that of the other River Glen cores and confirms the late medieval and post-medieval valley floor landscape to be extensively deforested and utilised for pasture and cereal production.

3. PALAEOECOLOGY OF ALLUVIAL SEDIMENT CORES FROM THE EWART – ETAL REACH (RIVER TILL)

Pollen analysis was undertaken on five sediment cores in the Ewart – Etal reach of the River Till (Milfield Basin), respectively at Mil 171-5, Mil 171-4, Mil-23, Mil-22 and Mil-15 (Figs 2.44–2.46).

Sediment core Mil 171-5

Sediment core Mil 171-5 is located on the Holocene alluvial surface north of the Till opposite the confluence with the Glen (Fig. 2.44) and reveals fine-grained Holocene alluvium to infill the palaeochannel to a depth of 320cm (Fig. 2.45). The pollen diagram for this core spans peat and organic-rich sediment between 195 and 115cm (Fig. C12) and has been differentiated into two pollen assemblages:

- Assemblage Mil 171-5 (II) (160–115cm); Floodplain alder carr, open oak/hazel woodland, grassland with pasture.
- Assemblage Mil 171-5 (I) (195–160cm); Open oak/hazel woodland with floodplain alder, grassland with pasture.

The lower assemblage, Mil 171-5 (I), lies between 195 and 160cm and has been dated at 188cm to *c*.1630–1430 cal BC (AA-53196; Table C1; Fig. C4). High counts of Poaceae (40–60%) and ruderal pollen point to an Early Bronze Age landscape with large areas of open grassland and pasture amidst areas of oak and

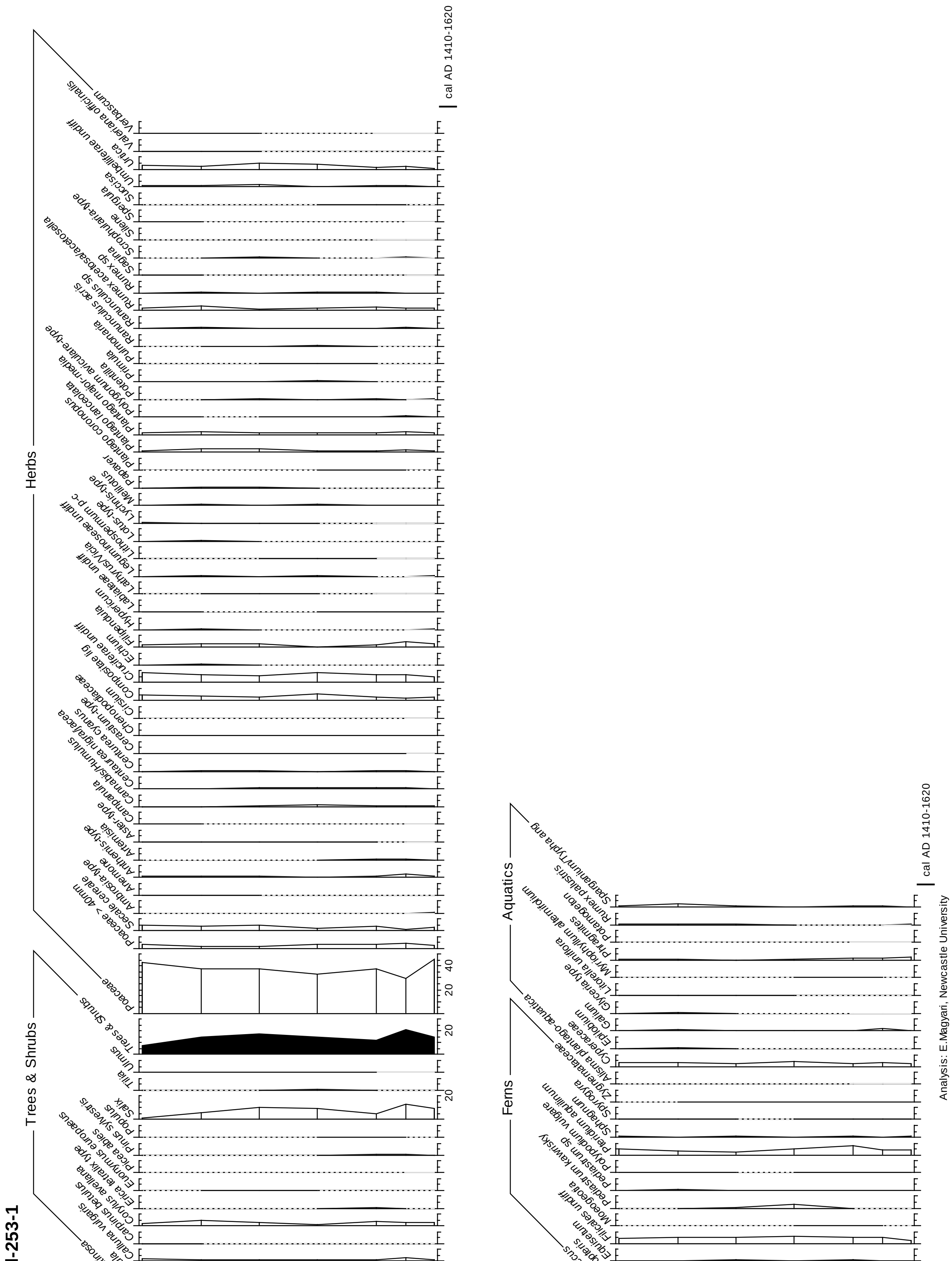


Fig. C9. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core M253-1, River Glen.

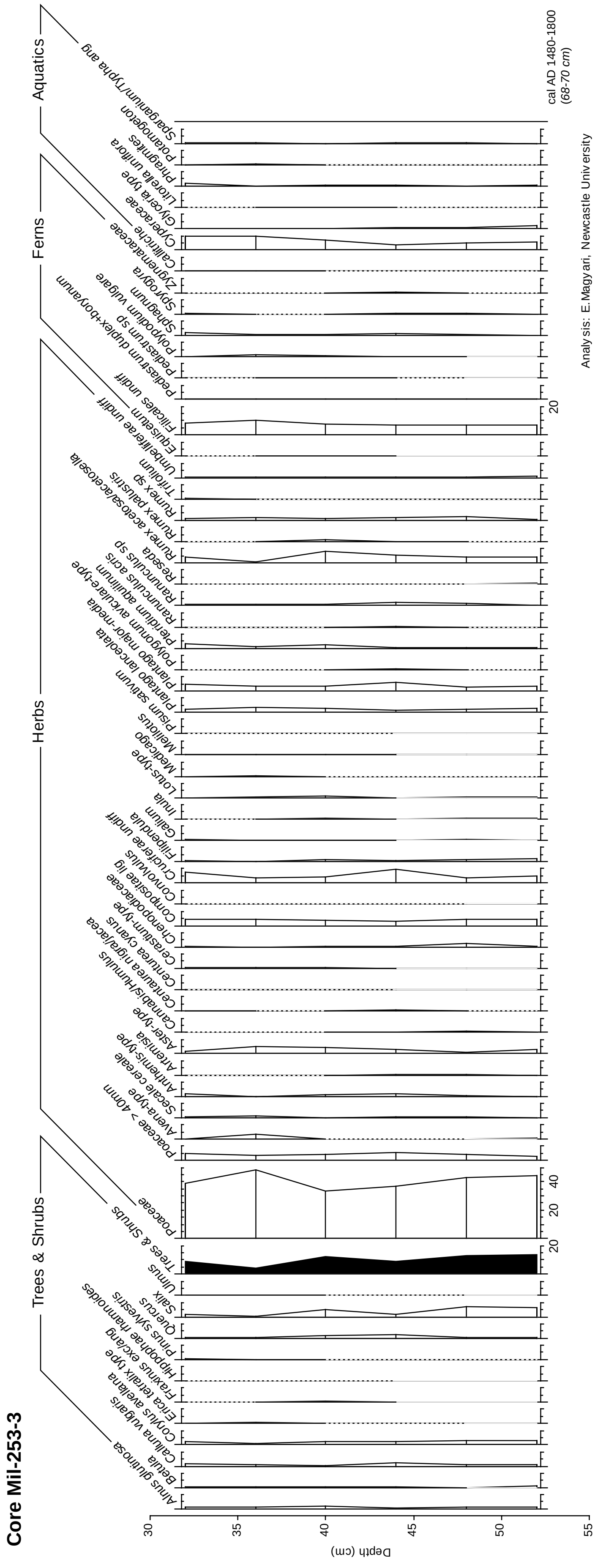


Fig. C10. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core M253-3, River Glen.

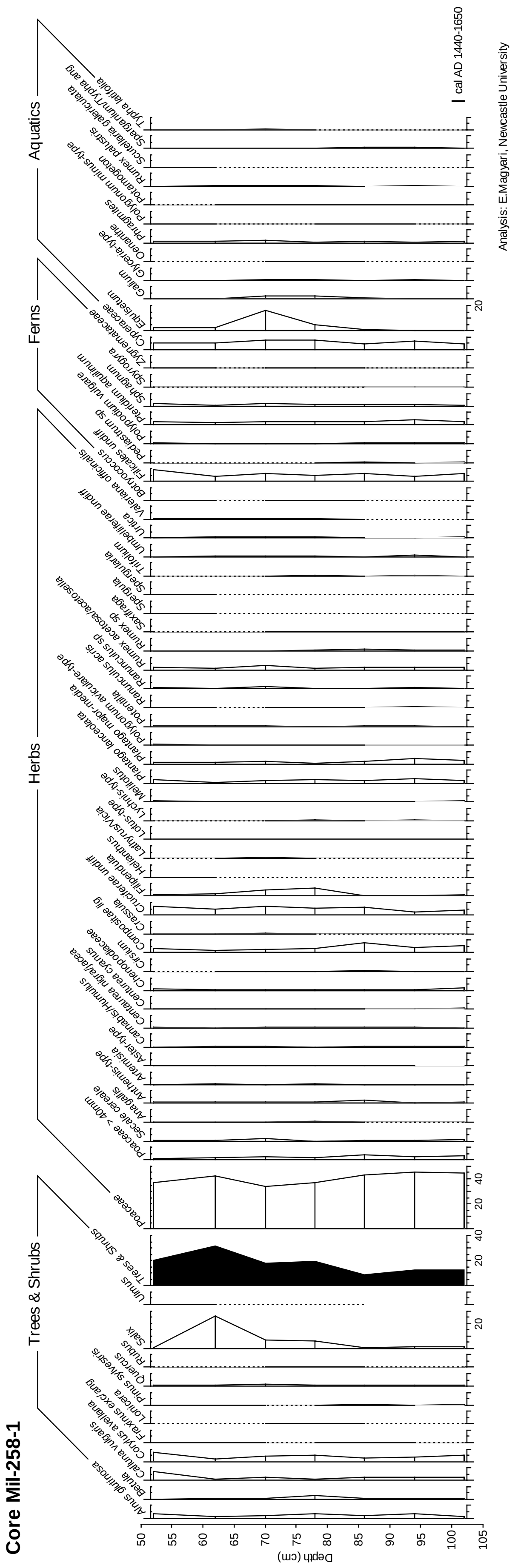


Fig. C11. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core M258-1, River Glen.

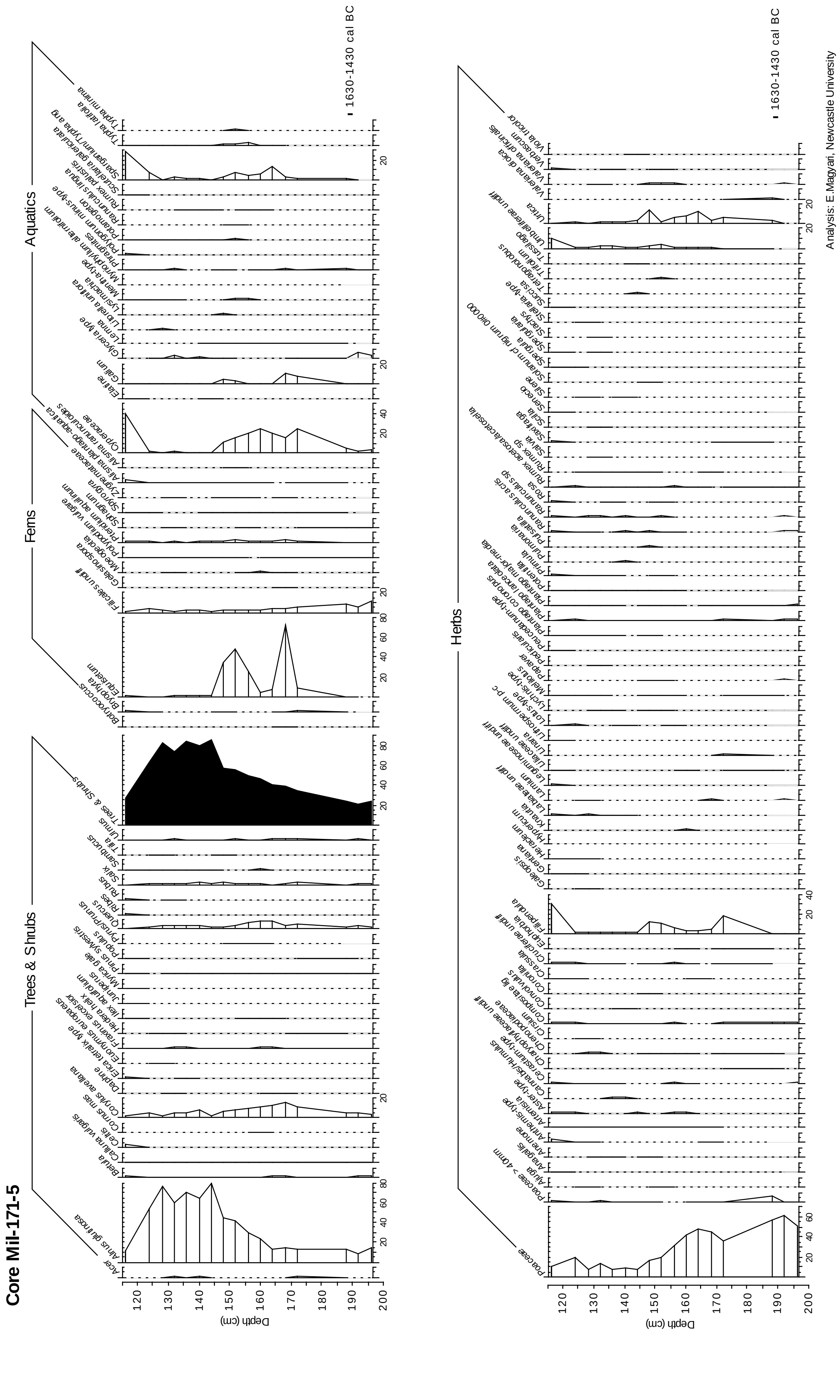


Fig. C12. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core Mil 171-5, Milfield Basin.

hazel woodland, with wetter parts of the floodplain supporting stands of alder (Fig. C12). Pastoral activities are sustained in the upper assemblage Mil 171-5 (II), but here the pollen diagram reflects a marked local expansion of *Alnus* at the expense of grasses and herbaceous taxa. At present there are no independent dating controls for this change in the local woodland cover; however, a broadly similar pollen assemblage from Mil 171-4, located in a palaeochannel 300m northwest of the core site (Fig. 2.44), has a basal date of *c*.1200–930 cal BC (see below) and suggests that floodplain alder carr in this part of the valley floor was probably established by the Middle Bronze Age.

Sediment core Mil 171-4

The pollen diagram for sediment core Mil 171-4 spans organic-rich and peaty sediments between 30 and 95cm (Figs 2.45 and C13). Dating control for this sequence is derived from peat between 88 and 90cm that has been dated on both the humic acid (AA-53194) and humin acid (AA-53195) fractions to *c*.1200–930 cal BC (Table C1 and Fig. C4). A single pollen assemblage has been identified that is broadly similar to Mil 171-5 (I), being dominated by *Alnus* with some *Quercus* and *Corylus*, and significant counts of Poaceae and herbaceous taxa indicative of open grassland with pasture (Fig. C13). A marked fall in *Alnus* counts at the very top of the sequence is countered by a rise in grasses and some ruderal pollen that suggests a local increase in woodland clearance, although this event currently lacks independent dating control.

Sediment core Mil-23

Sediment core Mil-23, located on the south-west side of the valley floor in the vicinity of Thirlings (Fig. 2.44) samples a channel fill sequence 140cm in depth with peat and abundant wood and plant remains in the lower 75cm (Fig 2.46). Dating control for this sequence is derived from a peat sample between 138 and 130cm that has been dated to *c*. 7600–7370 cal BC (Beta-119829; Passmore *et al*. 2002; Table C1 and Fig C4). The pollen diagram for this core (Fig. C14) has been differentiated into two pollen assemblages:

- Assemblage Mil-23 (II) (110–75cm): Alder-hazel woodland with some pine, oak and elm
- Assemblage Mil-23 (I) (140–110cm): Open landscape with sedges and grass, birch-willow-juniper scrub

The lower assemblage, Mil-23 (I), deposited in the period beginning *c*.7600–7370 cal BC, is characterised by a high proportion (*c*.40% total land pollen) of *Salix* with some other arboreal taxa including *Betula* (including *B.nana* type), *Juniperus* and *Corylus* (Fig. C14). Sedges (Cyperaceae), grass (Poaceae) and other herbaceous pollen are also well-represented. This mix of birch, willow and juniper scrub with abundant sedges and grasses (particularly in the lower levels of the assemblage, Fig. C14) is broadly consistent with vegetation records from other very early Holocene contexts in northern Britain (e.g. Innes and Shennan 1991), including the sequence at Akeld Steads (Borek 1975; Tipping 1998).

Assemblage Mil-23 (II) begins with a marked rise in *Corylus* and *Filicales* at 110cm that coincides with a decline in juniper, sedge and grass pollen (Fig. C14), and may reflect the end of the pioneer phase for early Holocene vegetation (*cf*. Innes and Shennan 1991). In the upper levels of the assemblage above 90cm the mix of arboreal pollen changes with a marked increase in alder and rising values of other broadleaved tree species (including *Quercus*, *Ulmus* and *Tilia*) at the expense of willow and birch. This transition is currently undated, but an equivalent phase at Akeld Steads occurs around *c*.5500 cal BC (Tipping 1998).

Sediment core Mil-22

The pollen diagram from sediment core Mil-22, located in a younger palaeochannel remnant 200m northwest of Mil-23 (Fig. 2.44), spans organic-rich and peaty sediments between 55 and 235cm (Fig. 2.46) and has been differentiated into two pollen assemblages (Fig. C15):

- Assemblage Mil-22 (II) (130–55cm): Open grassland with pasture and cereals, some floodplain alder and hazel/oak woodland
- Assemblage Mil-23 (I) (235–130cm): Open hazel/oak woodland, floodplain alder, grassland with pasture and cereals

Assemblage Mil-23 (I) spans 235 and 130cm and is dated at the base of the sequence to *c*.2130–1740 cal BC (Beta-119828; Passmore *et al*. 2002; Table C1 and Fig C4). Arboreal pollen account for between 30 and 50% of the total land pollen (Fig. C15) and is dominated by *Corylus*, *Quercus* and *Alnus*. Hazelnut macrofossils were also well-preserved between 185 and 200cm (Fig. C15). Relatively high counts of Poaceae, cereal-type and ruderal pollen also attest to open areas of grassland, pasture and cereal plots. Arable fields and hazel and oak woodland during this period was probably developed on drier parts of the alluvial valley floor and the free-draining glaciodeltaic terrace to the east of the core site, while poorly-drained parts of the landscape, including the palaeochannel wetland, supported alder carr.

Assemblage Mil-23 (II) begins at 130cm and is characterised by lower values of arboreal pollen (especially *Alnus*) and elevated counts of Poaceae and, in the uppermost part of the sequence, cereal-type pollen (Fig. C15). This trend suggests that both the drier and wetter parts of the local valley floor were subject to increased woodland clearance and an expansion in pastoral and arable land use. Elevated values of

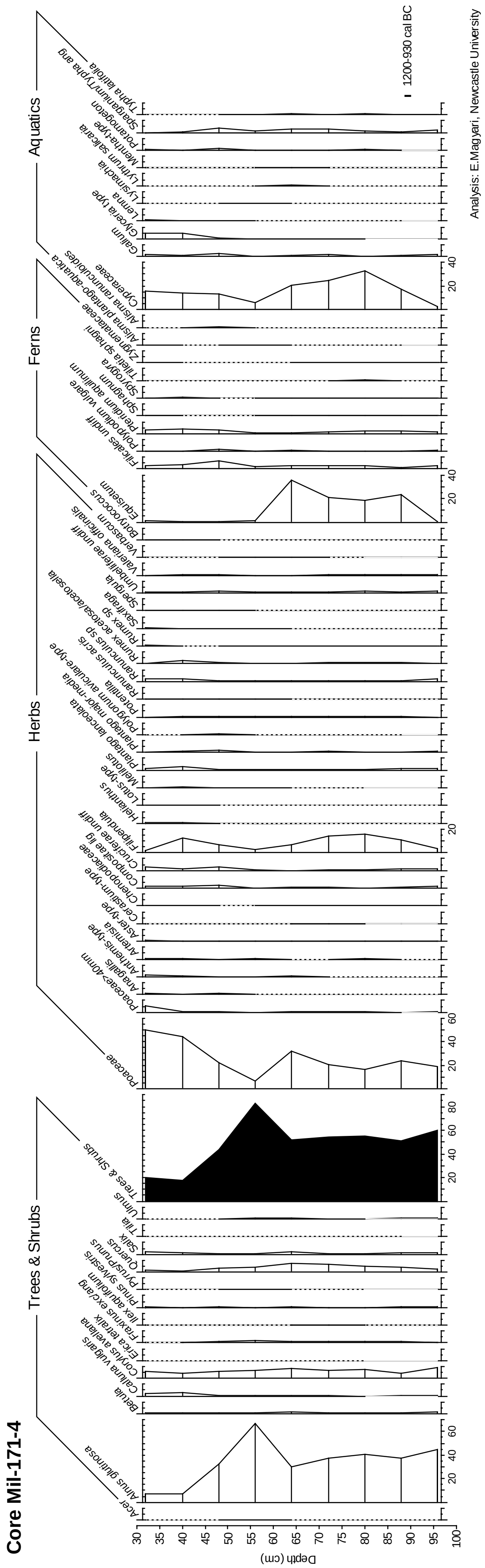


Fig. C13. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core Mil 171-4, Milfield Basin.

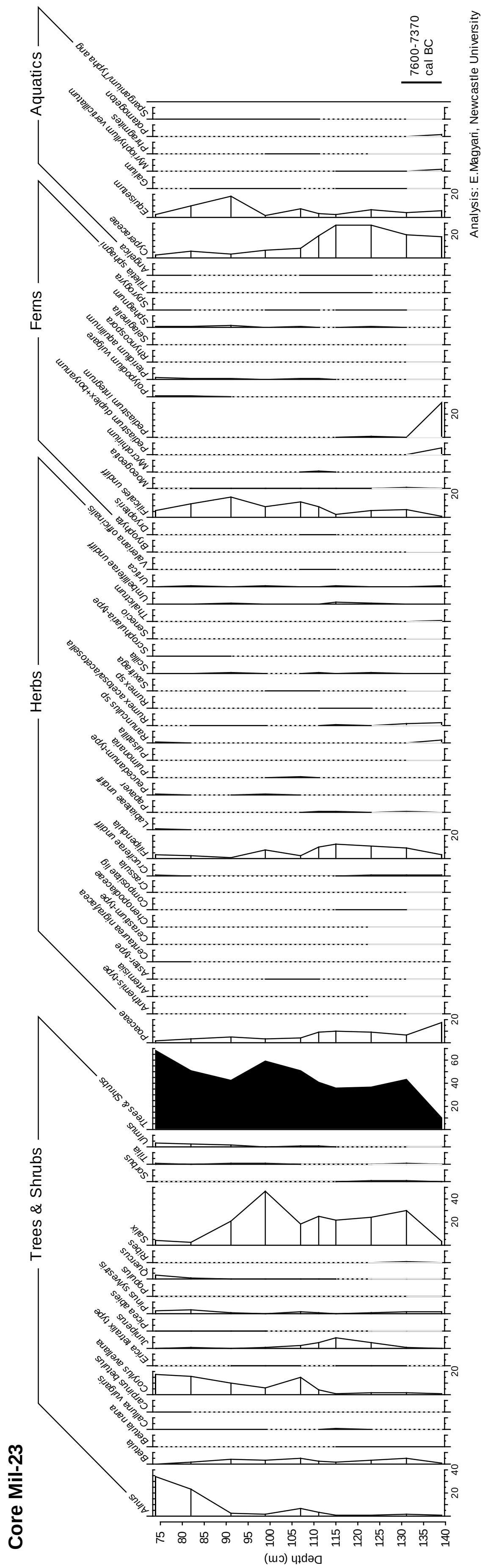


Fig. C14. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core Mil-23, Milfield Basin.

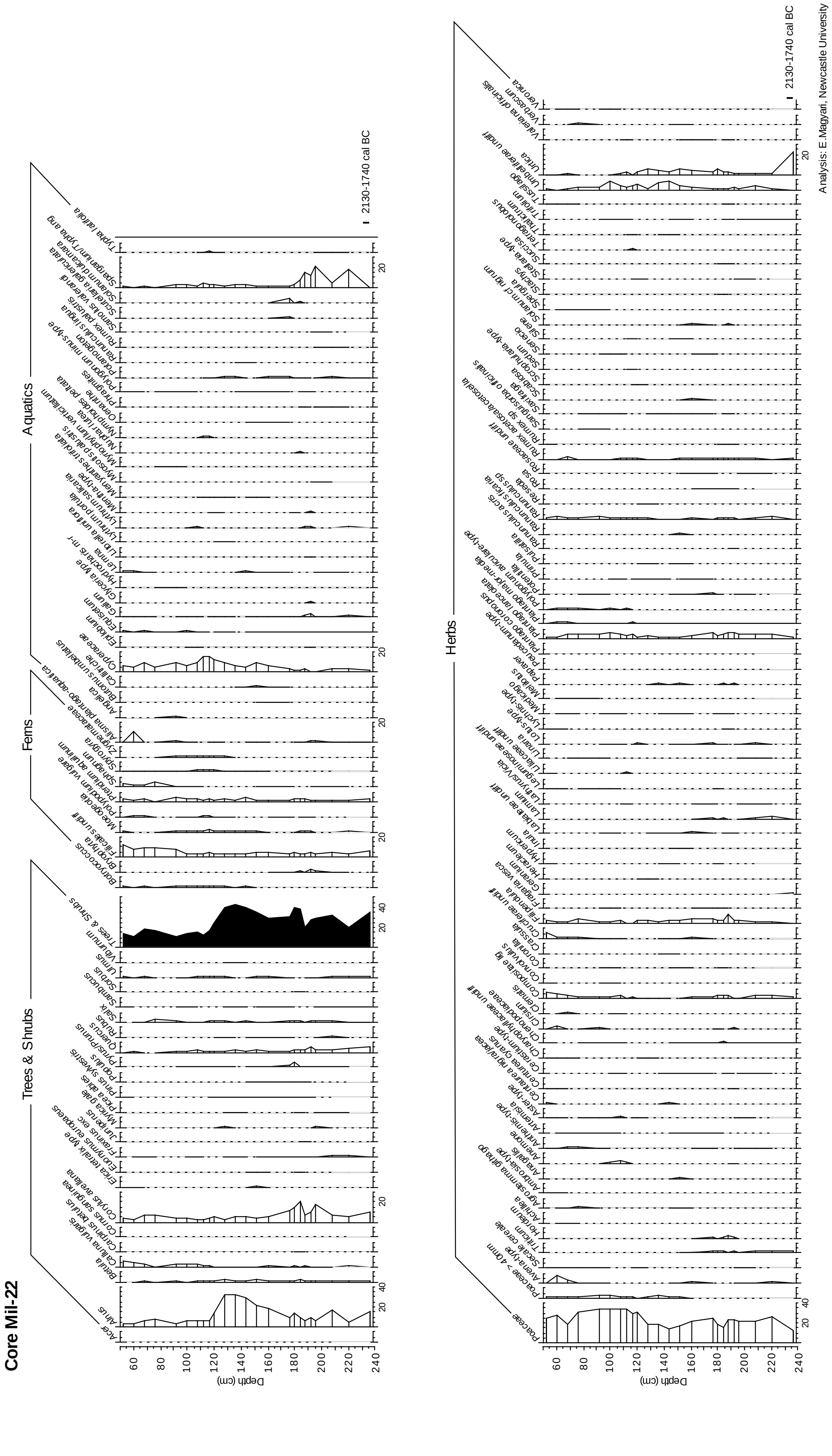


Fig. C15. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core Mil-22, Milfield Basin.

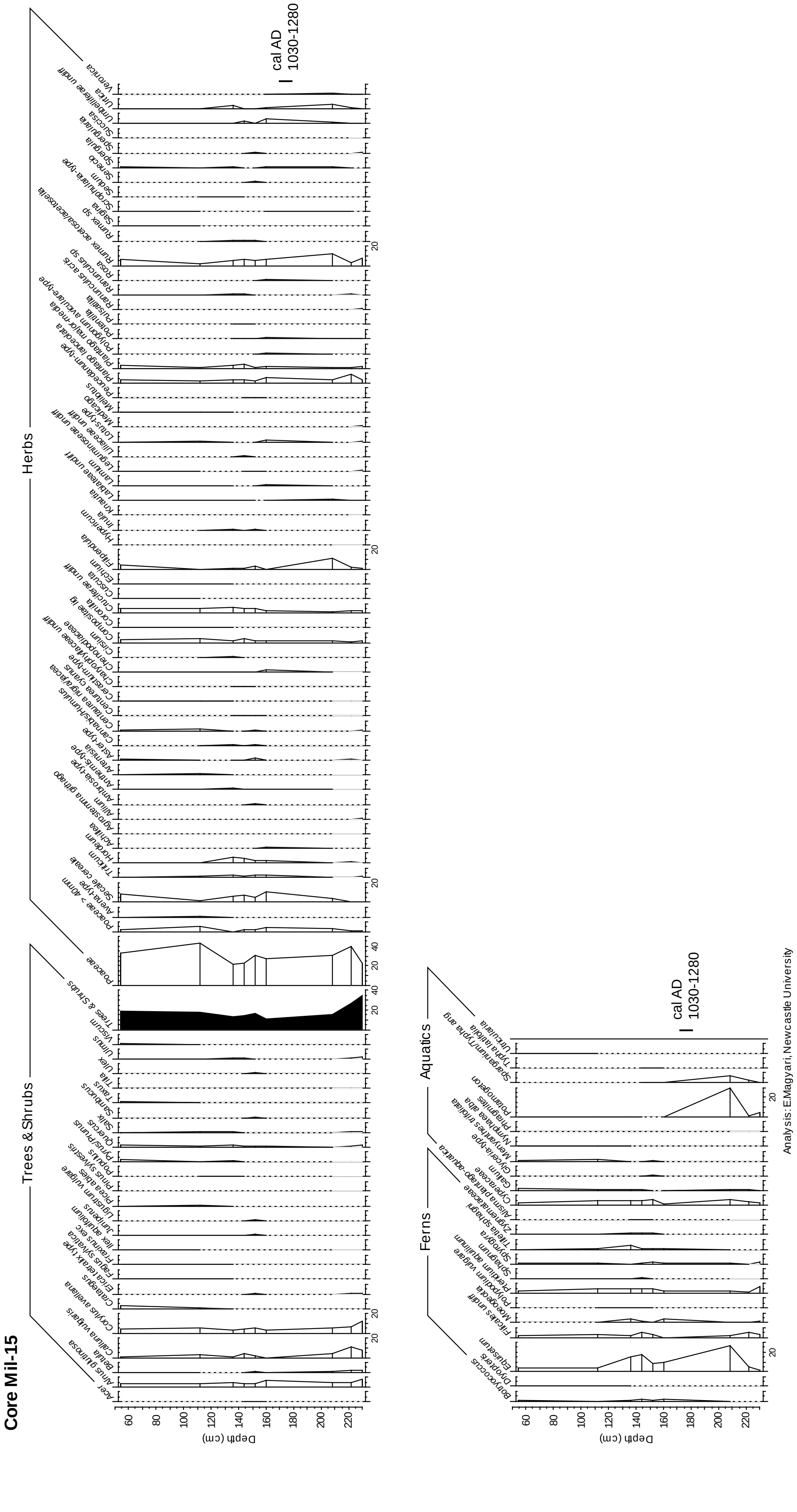


Fig. C16. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core Mil-15, Milfield Basin.

Calluna vulgaris in this upper assemblage most probably reflects inwash of pollen derived from heathland developed in higher parts of the river catchment.

Sediment core Mil-15

A single pollen assemblage characterises peaty and organic-rich channel fill deposits between 55 and 230cm at sediment core Mil-15 (Figs 2.44 and 2.45), located 2km downvalley from Mil-23 and 500m north-east of the Anglo-Saxon settlement site of Maelmin. A peat sample from between 170 and 178cm has yielded a date of *c*. cal AD 1030–1280 (Beta-119827; Passmore *et al*. 2002; Table C1 and Fig. C4) and indicates that the channel was abandoned and infilling at around the beginning of the medieval period. Arboreal pollen counts throughout this assemblage (with the exception of the lowest sample level at 230cm) are generally low at *c*.20% total land pollen (Fig. C16) and predominantly comprise *Corylus* and *Alnus* with some *Quercus*, *Ulmus* and *Betula*. Relatively high counts of Poaceae, cereal-type pollen (including *Secale cereale*, *Triticum* and *Hordeum*) and ruderal taxa point to a largely open landscape with extensive areas of pasture, hay meadows and cereal plots (Fig. C16). Much of this agricultural activity was probably focused on the upstanding and free-draining glaciodeltaic terraces lying immediately adjacent to the core site, and also only 500m to the southwest near the site of Maelmin.

Appendix D

Supplementary Details of Sedimentary Sequences and Palaeoecological Analyses Recorded on Holocene Alluvial Landform Elements in the Lower Tweed Valley

1. LOWER TWEED SEDIMENTARY SEQUENCES

Coldstream

Fluvial sedimentary sequences at Coldstream have been investigated by sediment coring at eight locations (TW1-4 and TW8-11; Fig. D1), while further sedimentary information is also available through eighteen sediment cores taken during a previous (unpublished) investigation at the site (Passmore and Macklin, unpublished data). Core sites CDS-1 and CDS-11 were re-cored as part of this project; unless stated otherwise, all references to these sites in discussion below are derived from the new cores. Figure 2.52 shows selected sediment core logs and a schematic model of the valley fill at Coldstream. Sediments below the main T3 surface were typically found to comprise an upper fine member of fining-upward gravelly coarse sands, well sorted medium-fine sands and massive fine sandy silt between 40 and 220cm thick. Organic content in these sediments was confined to occasional charcoal fragments. The fine member overlies an impenetrable coarse gravel member of indeterminate thickness (Fig. 2.52). Basal gravels are interpreted as former channel bed and bar deposits that are buried by a variable thickness of bar-top sands and fine gravels and overbank (floodplain) sandy silts.

Palaeochannel fills in the T3 terrace were found to comprise fining-upward sequences up to 340cm thick overlying impenetrable channel bed gravels. Fill sequences typically comprised bedded coarse-fine sands and massive fine sandy silts with occasional beds of organic-rich silt, peaty silt and peat; organic-rich deposits are most thickly developed at palaeochannel locations at or near the valley side where their long-term preservation may be promoted by high ground-water levels fed by valley-side springs and seepages. At core TW10, located in a palaeochannel undercutting the southern valley side margin (Fig. D1), laminated fine sands and silts with frequent macrofossil preservation formed the basal channel fill deposit between 250 and 320cm (Fig. 2.54). A sample of herbaceous plant stems and seeds from between 270 and 280cm (sample TWcd-1, Table D1, Fig. D2) was AMS ^{14}C dated to *c.* cal 50 BC–AD 80 (OxA-12600) and provides a maximum age for channel abandonment at this location.

Truncating this palaeochannel is a well-preserved, sinuous palaeomeander that extends for some 2.4km along the southern valley margin (Fig. 2.51). Core TW11 found the basal channel fill sediments to comprise fine gravelly sand between 260 and 300cm, overlain by 45cm of organic-rich laminated silts and fine sands (Fig. 2.54). Two samples of twig fragments (samples TWcd-3a and 3b, both identified as *Corylus* or *Alnus*) between 240 and 260cm gave AMS ^{14}C dates of *c.* cal AD 1020–1170 (OxA-12682) and *c.* cal AD 990–1160 (OxA-12683; Table D1), respectively. The same palaeochannel has been investigated at site CDS1, located 400m downchannel of TW11 (Fig. 2.51), where peaty clayey silt with occasional fine sand lenses forms the basal channel fill between 180 and 270cm (Fig. 2.53). Two discrete pieces of *Salicaceae* wood (samples TWcd-2a and 2b, Table D1) from a depth between 190 and 200cm both yielded AMS ^{14}C dates of *c.* cal AD 1000–1160 (OxA-12601 and 12681 respectively, Table D1, Fig. D2). Previous investigations at site CDS1 (Passmore and Macklin, unpublished data) recovered peaty silt and wood fragments between 200 and 210cm which gave a bulk ^{14}C date of *c.* cal AD 640–810 (SRR-6183, Table D1). However, the date ranges obtained by the four samples from TW11 and re-cored CDS1 sequences are notably consistent and appear to avoid any issue of contamination from reworked older material that may have affected this

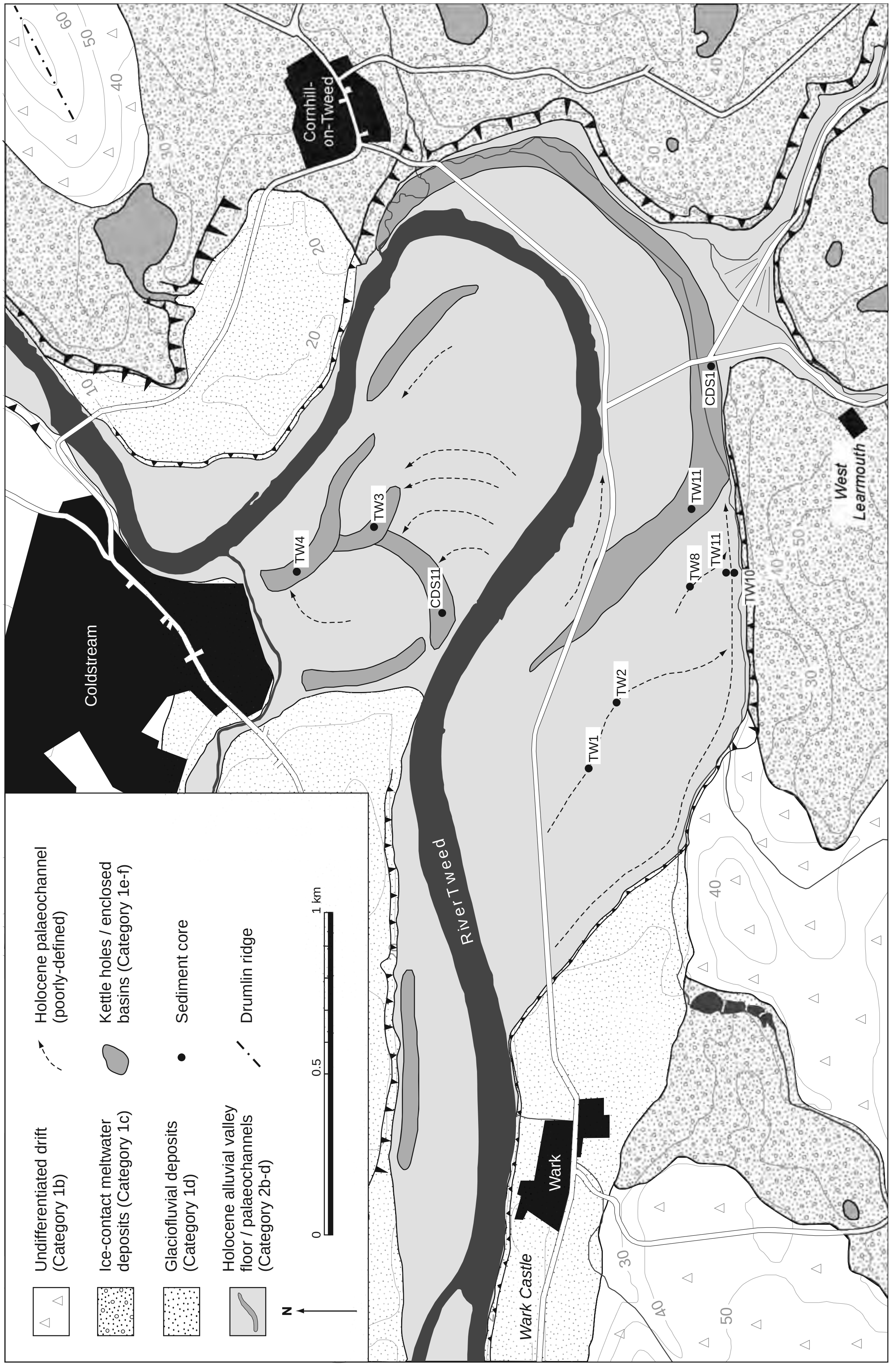


Fig. D1. Map of the lower Tweed valley floor at Coldstream showing Late Devensian and Holocene landform elements and locations of selected sediment cores.

Laboratory Code	Sedimentary sequence	Sample depth (below surface)	Sample	Material	δ^{13}C (‰)	^{14}C Age (BP)	Calibrated Date (95% confidence)
OxA-12600	TW10	270–285cm	TWcd-1	Herbaceous stem and seeds	-27.6	1996±27	40 cal BC– cal AD 50
OxA-12601	CDS1	190–200cm	TWcd-2(a)	*Salicaceae*	-27.0	969 ± 26	cal AD 1010–1160
OxA-12681	CDS1	190–200cm	TWcd-2(b)	*Salicaceae* roundwood	-26.6	980 ± 24	cal AD 1010–1160
OxA-15037	CDS1	105cm	TWcd-2(2)	Alder fragments	-26.8	335 ± 24	cal AD 1460–1650
OxA-12682	TW11	240–255cm	TWcd-3(a)	twig (cf. *Corylus/Alnus* sp.)	-30.4	943 ± 25	cal AD 1020–1170
OxA-12683	TW11	240–255cm	TWcd-3(b)	twig (cf. *Corylus/Alnus* sp.)	-28.3	996 ± 25	cal AD 990–1150
OxA-15048	TW11	212cm	TWcd-3(2)	Alder fragments	-27.9	964 ± 29	cal AD 1010–1160
Passmore and Macklin, unpublished data							
SRR-6183	CDS1	200–210 cm	--	Peaty silt and wood fragments	-29.0	1315±45	cal AD 640–780
SRR-6184	CDS6	300cm	--	Peaty silt and wood fragments	-26.6	Modern 99.45±0.54%	
SRR-6185	CDS11	180	--	Peaty clay	-27.5	635±50	cal AD 1270–1420

Table D1. ^{14}C dates from the lower Tweed at Coldstream.

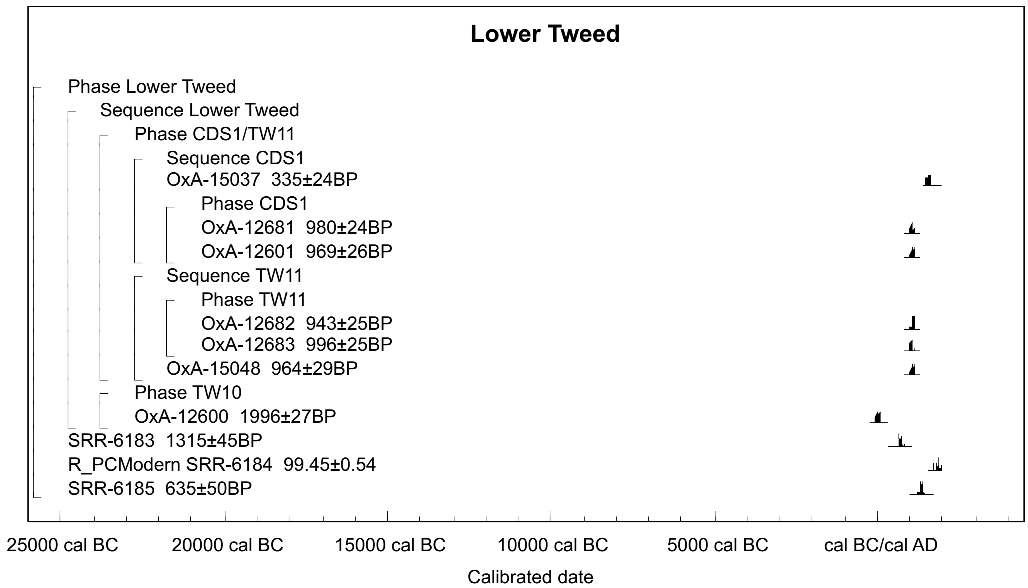


Fig. D2. Probability distributions of calibrated ^{14}C dates from the lower Tweed valley at Coldstream.

earlier ^{14}C sample. Accordingly, it is assumed that channel abandonment and the onset of infilling at this location had occurred shortly before the period *c.* cal AD 990–1170.

On the northern valley side, a T3 palaeochannel that dissects the northern part of Lees Haugh (Fig. 2.51) has been dated by earlier investigations at CDS11 by Passmore and Macklin (unpublished). Channel fill sediments at this location were found to reach a depth of 220cm and featured grey peaty silty clay between 160 and 200cm (Fig. 2.52). A bulk sample of this material at 180cm gave a date of *c.* cal AD 1280–1410 (SRR-6185, Table D1) and, on the assumption that this material was not contaminated by older carbon, would suggest that this channel was abandoned during the later medieval period.

The T3 terrace is locally truncated by younger terrace surfaces that lie 1m below the T3 surface (Fig. 2.52). On the south side of the river, a narrow terrace fragment designated T4 features a low-sinuosity palaeochannel that parallels the modern river and has been investigated at site CDS6 (Passmore and Macklin, unpublished data; Fig. D1). Here the channel fill deposits were found to reach a thickness of 360cm, with laminated sand, silt and clay containing occasional thin peaty lenses and wood fragments between 300 and 330cm. A bulk organic sample between 300 and 310cm yielded a modern radiocarbon age estimate (SRR-6184; Table D1). Although this sample may have been contaminated with younger organic material, the morphostratigraphic context of the palaeochannel is consistent with a date for abandonment during the post-medieval period prior to the mid-nineteenth century. T5 terrace surfaces also lie *c.*1 m below the T3 terrace and lie entirely within the zone of the valley floor that is confined by flood embankments (Fig. 2.52); on morphostratigraphic grounds these are also assumed to be post-medieval in date.

Green Hill

The study reach at Green Hill extends over 2km of the Tweed valley floor upstream of Horncliffe (Figs 2.49, 2.56 and D3). The present River Tweed in this reach has a gently sinuous planform with its outer meander bends cut into steep river bluffs of undifferentiated drift deposits and underlying bedrock. Holocene fluvial deposits are developed on the inner bends of each meander where they lie 5m below glaciofluvial (Category 1d) terraces (Fig. 2.49). An extensive low-relief terrace dominates the Holocene valley floor and has a surface elevation 4m above the present channel; on this basis it is provisionally correlated with the T3 terrace unit at Coldstream, 12km upvalley from Green Hill. A shallow and poorly-defined palaeochannel survives on the southern terrace unit where it lies parallel with the adjacent glaciofluvial terrace scarp, while small alluvial fans (Category 2a) grade to this terrace surface at the mouth of gully systems cut through undifferentiated drift (Fig. D3). Younger terrace fragments, designated T4, survive as narrow and discontinuous inset surfaces lying 1m below T3. A prominent, vegetated mid-channel bar 400m in length and locally known as Long Island (Figs. D3 and 2.56) has a surface at the same elevation and hence is also assigned to the T4 terrace unit. The nineteenth century and later floodplain (Category 2d) is present as narrow inset benches flanking the present channel (Figs D3 and 2.56).

Valley floor sedimentary sequences in the Green Hill reach were investigated in three cores taken from the western end of the reach; core TW5 was located at the distal margin of a small alluvial fan, while cores TW6 and 7 were sited on the main T3 terrace surface (Fig. D3) between the fan toe and the present channel. The sedimentary sequence below the fan surface (TW5) was found to comprise 150cm of unstructured fine sandy silt and clay overlying 40cm of fining-upward, poorly sorted gravelly silt and clay. These coarse sediments most probably represent the deposits of a fan-derived sediment rich flood event. Impenetrable gravels were encountered at a depth of 190cm. Sedimentary sequences underlying the main terrace surface at TW6 and 7 comprise a fine member of poorly-bedded, unstructured and inorganic grey silty clay with occasional fine sandy laminations. Core TW6 was terminated on reaching gravel at 350cm, while TW7 was abandoned at 400cm without reaching the basal levels of the fine member. By comparison with Holocene fills at Coldstream, the T3 terrace at Green Hill has a more thickly developed and finer-grained fine member with a distinctive grey coloration. No material suitable for radiocarbon dating was recovered from these sediments, and at present it is unclear whether this sequence represents the fill of a wide and deep palaeochannel belt that lacks modern surface expression or, given the location of the reach within the tidal limit of the river, reflects tidally-influenced sedimentation in a perimarine depositional environment.

2. Palaeoecology of lower Tweed sedimentary sequences at Coldstream

Sediment core TW10

Site TW10 is located in a T3 terrace palaeochannel on the southern margin of the Holocene fluvial valley floor to the south of Coldstream (Fig. D1). Channel fill sediments here reach a depth of 322cm and in their lower part, below 250cm, comprise organic-rich laminated sand and silt. Variable pollen preservation in this unit restricted full counts to five samples between 262 and 284cm (Figs 2.54 and C4), the lower level of which has been dated to *c.* cal 50 BC–AD 80 (OxA-12600; Table D1). The pollen record over these levels indicates a Late Iron Age landscape dominated by grassland, together with herbs such as *Plantago media/major* and *P. lanceolata* (Fig. D4). The presence of *Liguliflorae*, Asteraceae and Caryophylaceae is suggestive of disturbed ground, due either to river erosion and flooding or anthropogenic intervention (although there is no clear evidence of cultivation). A limited woodland cover at this time composed mixed temperate broadleaf taxa, especially *Quercus* and *Corylus* that probably reflect comparatively drier settings on the adjacent lateglacial sand and gravel terraces (Fig. D1). The aquatic environment of the palaeochannel itself is dominated by significant amounts (10–30%) of Cyperaceae and *Typha angustifolia/Sparganium* emergents, suggesting that these levels were associated with shallow open water. The presence of a floodplain lake is also supported by macrofossil remains of plants that live in aquatic habitats (*Alisma plantago-aquatica* and *Potamogeton* spp.) although some seeds from wetland, riparian and ruderal habitats (e.g. *Chenopodium album*) are also present and reflect either

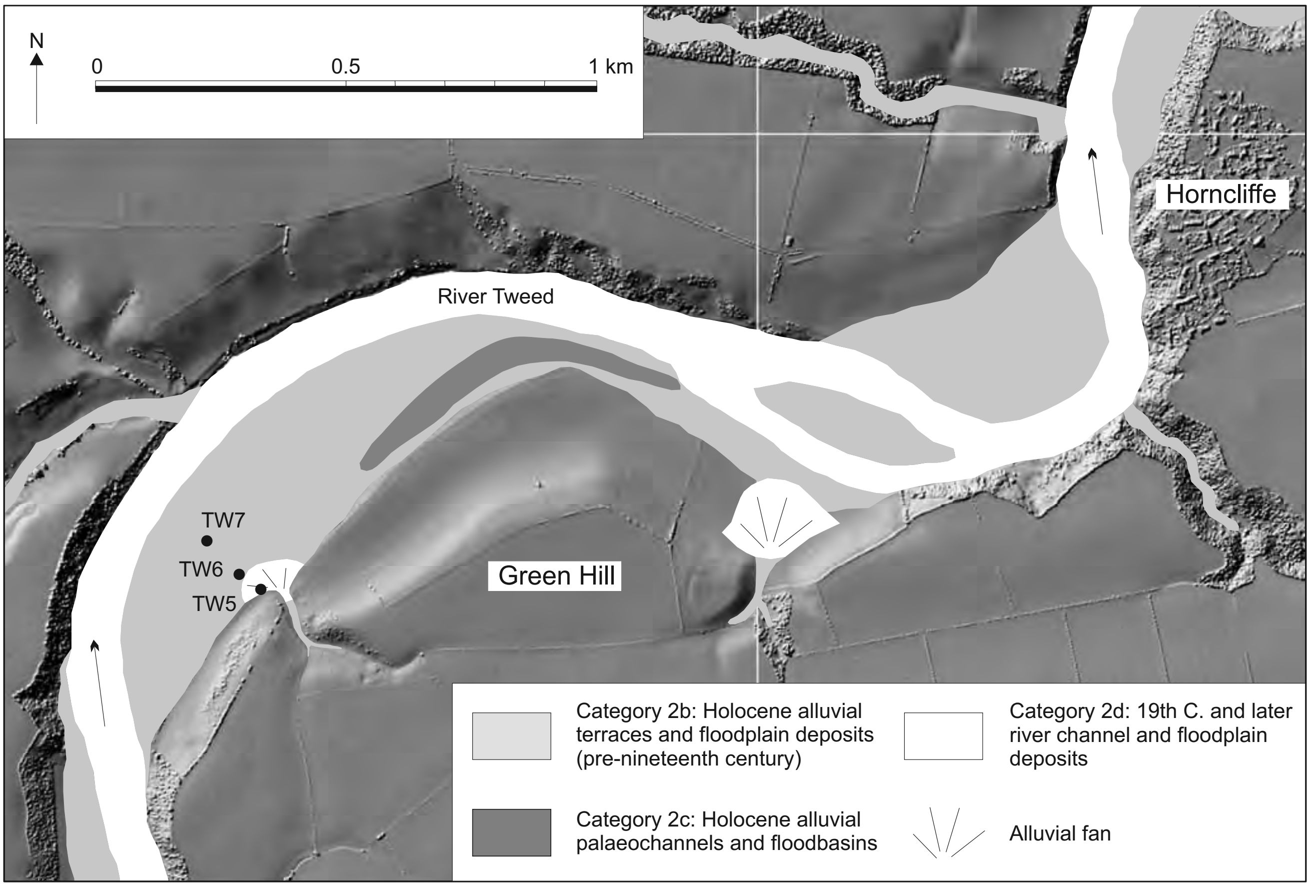


Fig. D3. LiDAR-derived image of the lower Tweed at Green Hill (Horncliffe) showing Holocene alluvial landform elements and location of sediment cores.

their close proximity or the inwash of allochthonous material (Fig. 2.54).

Sediment cores TW11 and CDS1

Sites TW11 and CDS1 lie 450m apart in an extended and well-preserved palaeochannel on the southern margin of the T3 terrace (Fig. D1). Channel fill deposits at TW11 reached a depth of 300cm and featured organic-rich silt between 215 and 260cm. The lower part of this organic-rich unit dates to *c*. cal AD 990–1160 (OxA-12682 and 12683, Table D1) and indicates that channel abandonment occurred around the transition from the first to second millennium AD. Pollen preservation was variable through the silt unit and only two samples between 224 and 234cm yielded good counts (Fig. D5). Pollen assemblages from these samples are similar to those in the older channel fill at TW10 (see above; Fig. D4), being characterised by a largely grassland environment with a small amount of temperate broadleaf woodland including *Alnus* and *Quercus* (Fig. D5). There are few direct indicators of disturbance and agricultural activity although the landscape is substantially deforested by this time. The macrofossil record above *c*.240cm is dominated by *Carex* seeds and suggests that channel filling in the period following *c*. cal AD 990–1160 was occurring in the context of a wetland or marshy habitat (Fig. 2.54).

Channel fill deposits at CDS1 reached a depth of 270cm and contain organic and organic-rich fine sediment between 100 and 210cm (Fig. 2.53). This sequence has been dated between 200 and 210cm to *c*. cal AD 1010–1160 (OxA-12601 and 12681; Table D1) and this chronology corresponds well to that obtained from TW11 (see above; Table D1 and Fig. D2). Pollen samples from CDS1 were prepared at 8cm intervals between 102 and 196cm. However, samples between 108 and 160cm exhibited low pollen concentrations and poor preservation; sediments in these levels are characterised by fine sandy laminations (Fig. 2.53) and hence the sparse pollen record most probably reflects rapid rates of sedimentation during this phase of channel filling. Pollen samples in the upper (102–108cm) and lower (160–196cm) parts of the sequence show an open valley floor environment dominated by grassland and a relatively low woodland cover (<30% arboreal pollen) composed mainly of *Alnus*, together with *Corylus* (Fig. D6). Aquatic environments are well represented in the organic-rich sediments of the lower

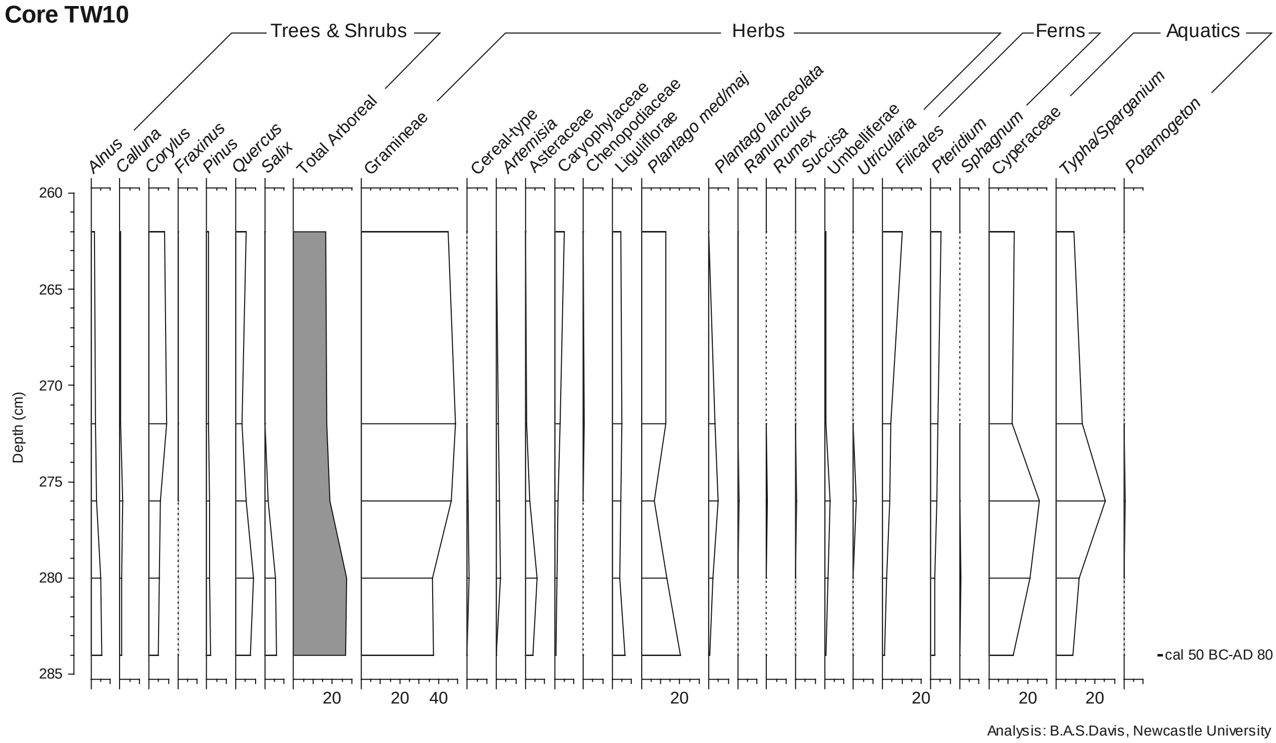


Fig. D4. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core TW10, Coldstream, lower Tweed valley.

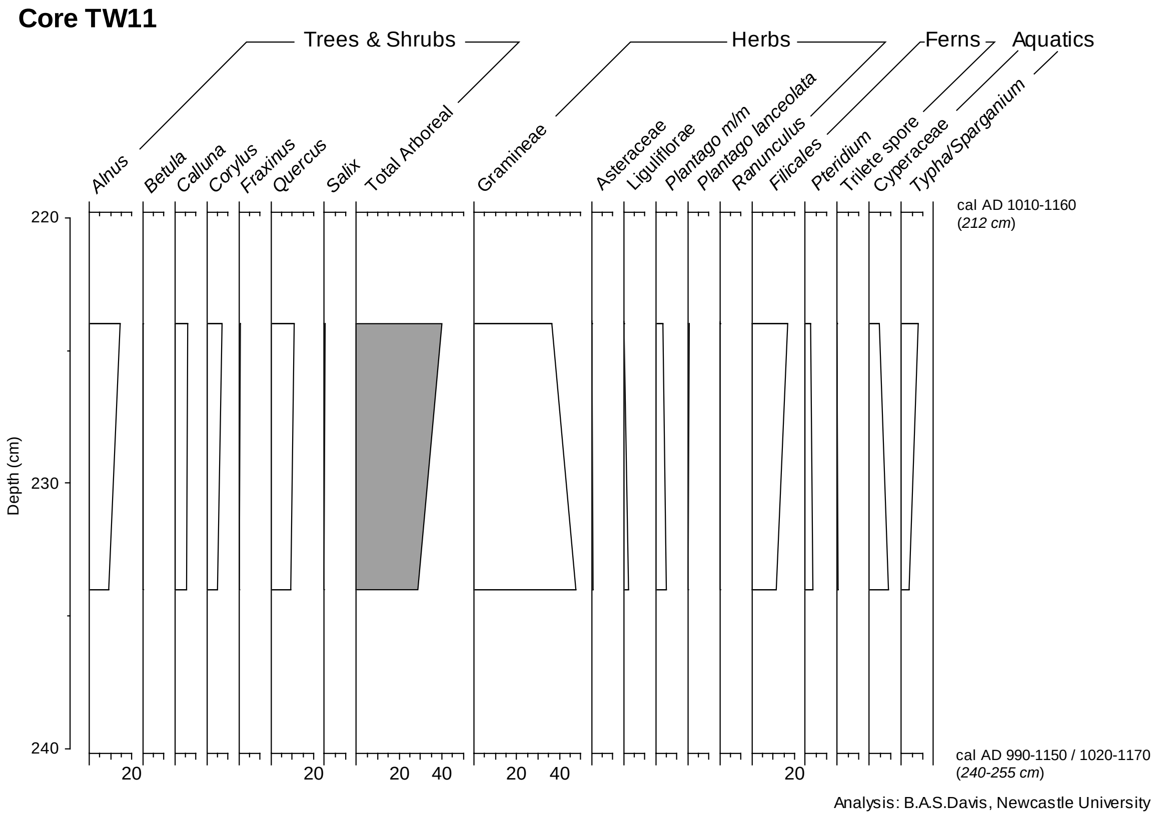


Fig. D5. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core TW11, Coldstream, lower Tweed valley.

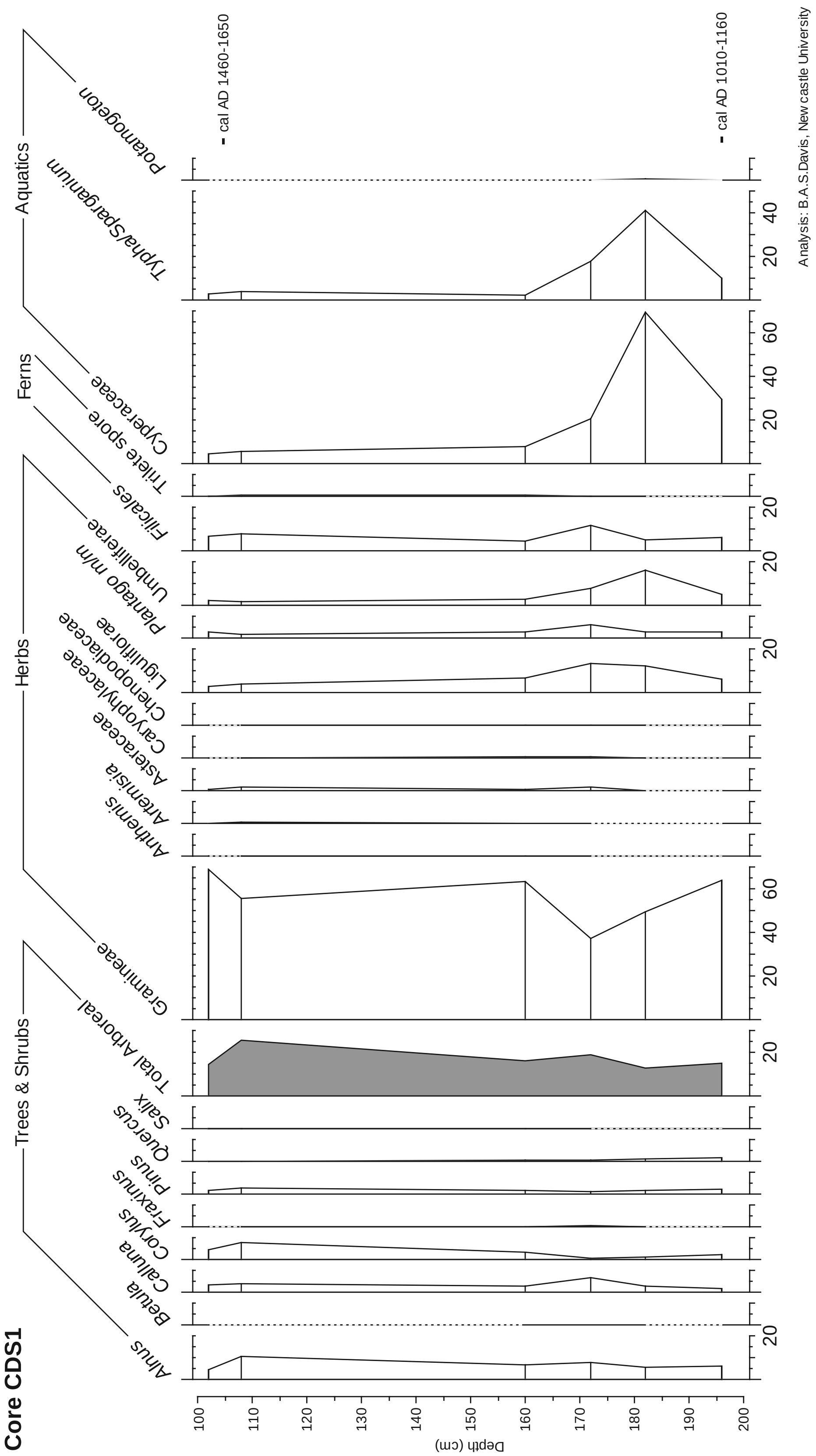


Fig. D6. Pollen diagram (% total terrestrial pollen sum) for organic-rich sediments in palaeochannel core CDS1, Coldstream, lower Tweed valley.

Sediment Core CDS11 (Coldstream, lower Tweed valley)

Depth (cm)	^{14}C	Sediment	Pollen Assemblage*	Macrofossil remains: depth (cm)	Macrofossil remains: volume (ml)	Macrofossil remains: species present (count)	Insect remains: Depth (cm)	Insect remains: fauna size	Insect remains: species present
70–160		Silty fine sand, becoming clayey with depth	Deforested, open grassland*	130–135	5	*Callitriche* cf. *stagnalis* (2) *Juncus* spp. (2) *Glyceria fluitans* (4)	130–170	limited	Hydraenidae (*Helophorus* spp.) Scarabaeidae (*Aphoidus* spp.) Curculionidae (*Sitona* spp.)
			Open woodland, grassland with disturbance*	150–155	10	*Juncus* spp. (36) *Callitriche* cf. *stagnalis* (1)			
160–205		Silty clay		165–170	10	*Juncus* spp. (6) Degraded seed (1)			
	cal AD 1280–1410								

* data from pollen preservation assessment only (van der Schriek and Passmore, 2004)

Table D2. Summary of sediment type, ^{14}C chronology, pollen assemblages, macrofossil and insect analyses for Core CDS11, Tweed study block.

part of the sequence with particularly high pollen percentages (>40%) of aquatic emergents (Cyperaceae, *Typha angustifolia*/*Sparganium*), and this is supported by macrofossil remains of aquatic and wetland species indicative of open water and vegetated margins (Fig. 2.53). Pollen samples from the less-organic sandy clayey silts between 102 and 108cm are, by contrast, characterised by much lower percentages of aquatic species, although the macrofossil record for these sediments continues to be representative of both open water and wetland environments (Figs D6 and 2.53).

There is little direct evidence of anthropogenic activity in the pollen record from CDS1. However, a charred breadwheat cereal grain (*Triticum aestivum)* was preserved in sediments between 190 and 196cm, and charred cereal grains and a cereal stem were recovered between 160 and 150cm (Fig. 2.53), which is suggestive of cereal processing in the vicinity of the site. Breadwheat has been cultivated in northern England from the Romano-British period onwards, although occasional finds from the Iron Age have been recorded (Huntley and Stallibrass 1995, Cotton 2001).

Sediment core CDS11

Site CDS11 is located in a well-preserved palaeochannel on the T3 terrace surface on the northern side of the valley floor near Coldstream (Fig. D1). Channel fill sediments here reached a depth of 205cm and include a basal unit of organic-rich silty clay between 160 and 205cm. This sequence has been dated at 180cm to *c*. cal AD 1280–1410 (SRR-6185; Table D1) and indicates local channel cut-off occurred during the late medieval period. Pollen preservation from sediments in this core did not facilitate full pollen counts, although a preliminary assessment of four samples spanning 132 to 168cm yielded evidence of an open/deforested landscape with grassland and pasture in the vicinity of the site (van der Schriek and Passmore, 2004; Table D2). This provisional data is supported by the preservation of insect species including dung beetles and 'clover' weevils in sediments between 130 and 170cm (Table D2).

Appendix E

Evaluation of Colluvial Landform-Sediment Assemblages in the Milfield Basin

INTRODUCTION

Holocene colluvial deposits (Category 2a landform elements) mantle the lower facets of hillslopes and terrace bluffs throughout the study area, as well as forming lynchets upslope of field boundaries. To date, however, investigation of colluvial landform-sediment assemblages has been restricted to a preliminary assessment by machine trenching of hillslope and lynchet sedimentary sequences at the following locations:

(i) two lynchets on Milfield Hill (Trenches MCT-1 and 2, Figs E1 and E2);
(ii) a colluvial deposit below Dove Crag (Trench MCT-3, Figs E1 and E3);
(iii) a colluvial deposit at Akeld Steads Bridge (Trench MCT-4, Figs E1 and E3).

The following sections describe the soil and sediment sequences by reference to section drawings E2 and E3. Numbers in [brackets] refer to discrete soil and sediment units (contexts) identified on section drawings.

Lynchet forms on Milfield Hill

Two prominent landforms resembling lynchets lie on the upslope side of major vegetated field boundaries traversing drift mantled slopes (Category 1b landform elements) to the west of Milfield village (Fig. E1). These have been investigated by machine-excavated 12 × 1m trenches orientated downslope and located so as to reveal soil and sedimentary sequences adjacent to both sides of the field boundary (Trenches MCT-1 and MCT-2, Fig. E2). Trench MCT-1 was cut through the field boundary dividing fields 22 and 23 and excavated to a maximum depth of 1.8m (Fig. E2). Basal sediments here lie between 80 and 20cm below the modern ground surface and comprise a brown-orange gravelly sandy silt/clay diamict [6] interpreted as the upper levels of till deposits. These glacigenic sediments are overlain by a thin (max. 20cm) and localised deposit of dark brown clayey silt with occasional angular fine gravel inclusions [5] and a thicker (max. 80cm) deposit of structureless mid-brown fine sandy silt with rare fine gravel inclusions [2]. The latter deposit is most thickly developed below and upslope of the field boundary hedge and pinches out over underlying till [6] immediately downslope of the boundary. Two narrow cut features [3] and [4] are cut through [2] and underlying till [6] although their upper limits are indeterminate. These cut features are orientated perpendicular to the field boundary and are infilled with structureless brown clayey silty sand [3] and loosely packed sandy cobble gravels. Cut [3] contains a modern field drainpipe while cut [4] is also interpreted as a modern field drain. The sequence in MCT-1 is capped by a dark brown sandy silt ploughsoil [1] that reaches a maximum depth of 35cm, and which downslope of the field boundary hedge directly overlies till [6]. In summary, Trench MCT-1 has revealed a colluvial sedimentary sequence ([2] and [5]) that has accumulated upslope of a well-established field boundary and which overlies till deposits. Colluvium is absent on the downslope side of the boundary where the ploughsoil is cut directly into till. No buried landsurfaces or organic-rich deposits were evident at this site.

Trench MCT-2 was cut through the field boundary dividing fields 21 and 22, upslope from MCT-1, and was excavated to a maximum depth of 1.5m (Fig. E2). Basal sediments here lie between 90 and 40cm below the modern ground surface and comprise a brown-orange gravelly sandy silt/clay diamict [18] equivalent to till deposits [6] evident in MCT-1. Basal till here is locally overlain by a deposit of mid-grey clayey silty fine sands [15] and [16], up to 20cm thick, that contain a thin dark grey clayey fine sandy silt (max. 5cm thick) with occasional organic inclusions and frequent charcoal flecks [17]. Contexts [15–17] infill a very shallow depression formed in underlying till and most probably represent an early phase of localised colluviation, perhaps following disturbance of hillslope soil and vegetation cover. These sediments are overlain by up to 30cm of dark grey fine sandy silt with

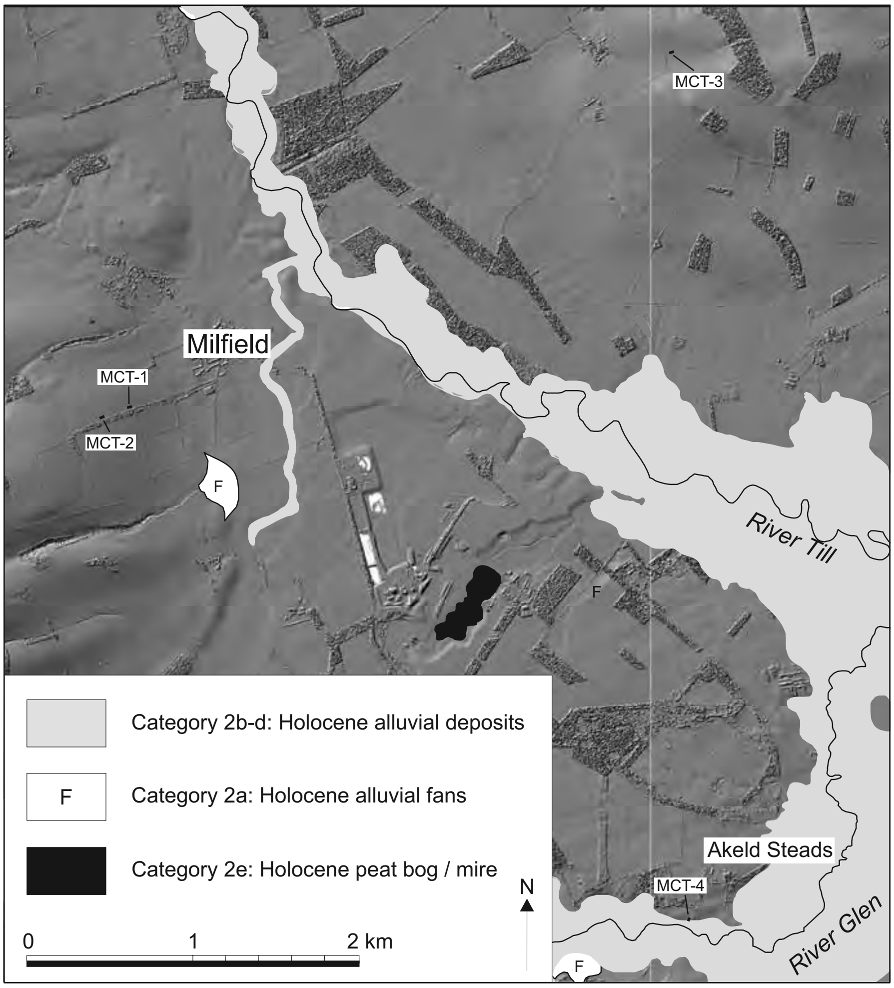


Fig. E1. Location of Trenches MCT1-4.

occasional fine gravel inclusions [12] that is most thickly developed upslope of the field boundary hedge and pinches out below the boundary over underlying till [18]. Context [12] is in turn buried by 20–50cm of structureless mid-brown fine sandy silt with rare fine gravel inclusions [8] that are believed to be equivalent to colluvial deposit [2] in MCT-1. Both contexts [12] and [8] are interpreted as colluvial sediments that have accumulated upslope of the field boundary hedge. Three narrow cut features [9], [10] and [11] are cut through [8] and underlying deposits although their upper limits are indeterminate. These cut features are orientated perpendicular to the field boundary and are infilled with loosely packed sandy cobble gravels. They are interpreted as modern field drains equivalent to [4] in MCT-1. The sequence in MCT-2 is capped by a dark brown sandy silt plough-soil [7] that reaches a maximum depth of 40cm. In summary, Trench MCT-2 has revealed a colluvial sedimentary sequence that has accumulated upslope of a well-established field boundary and which overlies till deposits. Colluvium is comparatively thinly developed on the downslope side of the boundary. Slightly organic sediment from context [17] was analysed for pollen content and preservation but yielded no pollen content.

Colluvial deposits below Dove Crag

Sediments comprising the footslope of a north-facing drift mantled hillslope above the valley floor of a small stream below Dove Crag were investigated by Trench MCT-3 (Figs E1 and E3). Excavation of this trench was halted on reaching a length and width of 8 by 1m, and a depth of 1.5m, by slumping (particularly in the southern part of the trench) and rapid infilling with groundwater. Basal sediments here comprise structureless clean grey clay [26] with a maximum exposed thickness of 30cm overlain by clean, finely-laminated clays, silts and fine-medium sands up to 35cm thick [25]. These sediments are interpreted as glaciolacustrine sediments equivalent to deposits described by Payton (1980) in this part of the Milfield Basin. Overlying laminated sediments [25] are un-

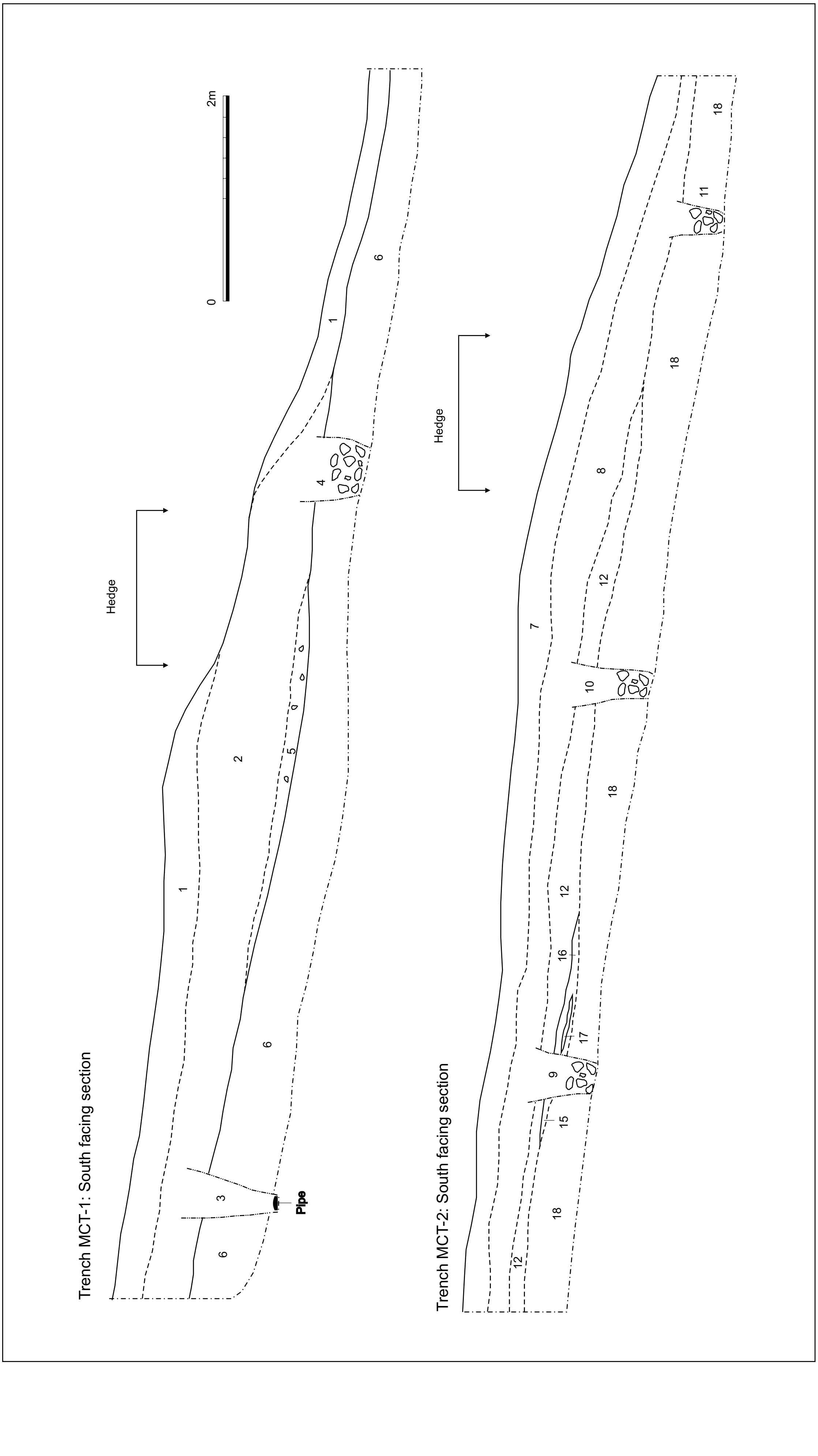


Fig. E2. Section drawings of Trenches MCT-1 and MCT-2.

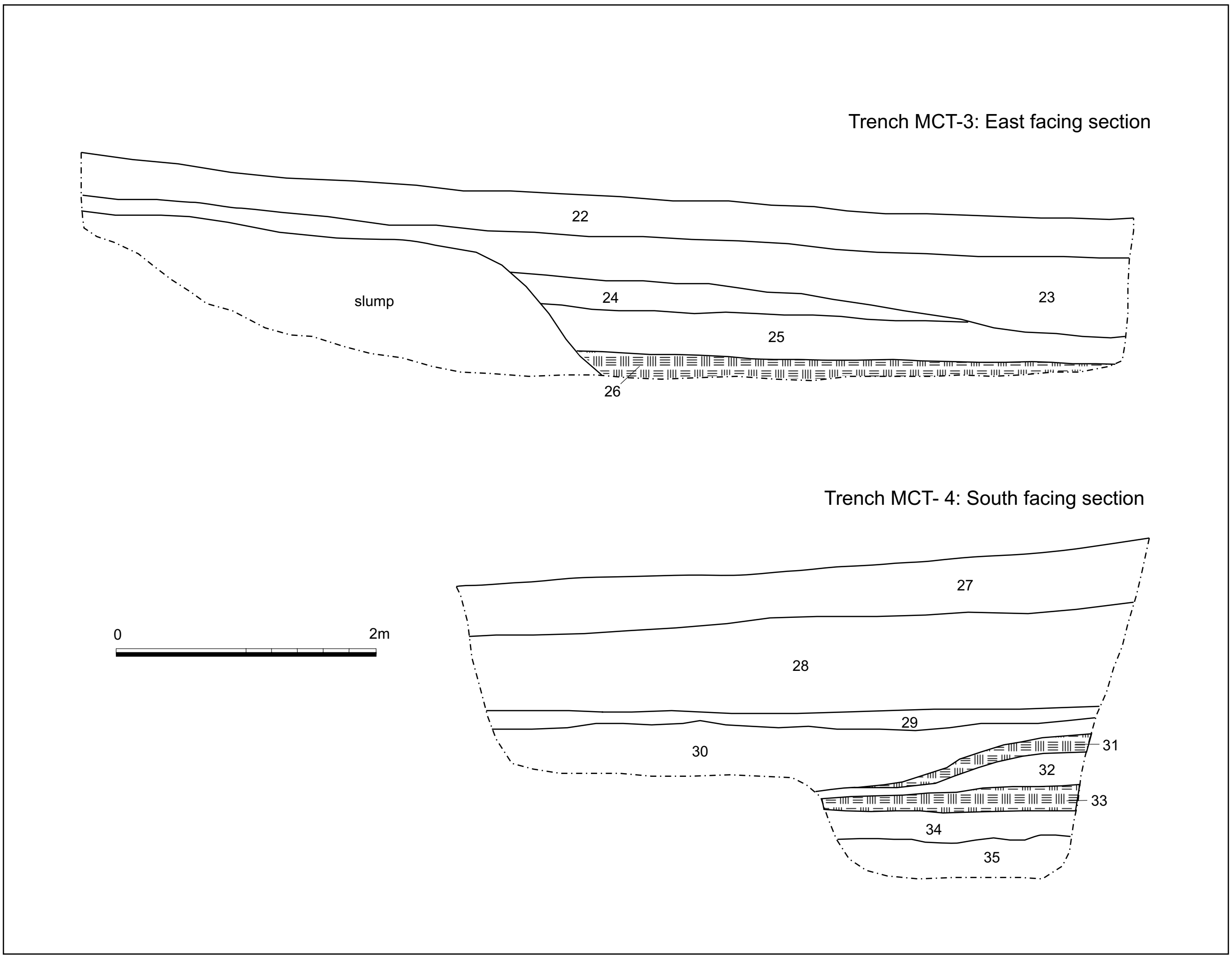


Fig. E3. Section drawings of Trenches MCT-3 and MCT-4.

structured dark grey-green fine gravelly silty sands [24] up to 20cm thick, and which thin and pinch out over [25] in the northern part of the trench. These relatively coarse sediments are buried by up to 60cm of unstructured dark grey-brown silty fine sand with occasional charcoal flecks and fine gravel inclusions [23] that are most thickly developed at the base of the slope in the northern limit of the trench. Both [24] and [23] are interpreted as bioturbated colluvial deposits accumulating at the lower margins of the hillslope. The sequence is capped by a sandy silt ploughsoil [22] up to 35cm thick. No buried landsurfaces or organic-rich deposits were evident in this trench.

Colluvial deposits at Akeld Steads Bridge

Sediments comprising the footslope of a south-facing terrace bluff forming the margin of a Lateglacial (Category 1d) glaciofluvial terrace at Akeld Steads Bridge were investigated by Trench MCT-4 (Figs E1 and E3). This trench was excavated to a length and width of 5 by 1.5m, and a maximum depth of 2.5m (in the northern part of the trench). Basal sediments here comprise poorly sorted gravelly sandy silty clay [35] with a maximum exposed thickness of 30cm that is overlain by alternating beds of laminated pink/grey/green fine sands, silts and clayey silts [34] and [32] and structureless compact brown sandy silty clays [33] and [31] that form a maximum depositional thickness of 1.2m. The uppermost deposit of this sequence [31] dips to the south and thins out over [32]. This basal sequence [31–35] is provisionally interpreted as representing Holocene alluvial deposits of the River Glen. Overlying [31] is a mottled grey-brown deposit of silty clayey fine sand with occasional fine gravel inclusions, charcoal flecks and traces of fine lamination [30]. These sediments reach a maximum thickness of 50 cm and thin out to the north over the rising surface of [31] and are interpreted as alluvial overbank sediments (possibly with a locally sourced colluvial component) of the River Glen which are infilling a shallow channel-like depression cut into underlying alluvium. Overlying [30] is a thin (max. 20cm) bed of grey-brown silty fine-medium sand with frequent fine gravel inclusions [29]. These sediments may represent a large flood event or colluvial run-out deposited on the valley floor adjacent to the terrace bluff, and are in turn buried by a relatively thick (max. 80cm) deposit of unstructured mid-brown clayey silty fine sands with occasional fine gravel inclusions and frequent charcoal flecks [28]. The latter deposit has an upper surface that rises to the north parallel to the lower slope of the terrace bluff and is interpreted as primarily colluvial sediment, possibly with an alluvial input, accumulating at the margin of the valley floor. The sequence is capped by a silty sandy colluvial topsoil up to 40cm thick [27]. No well-developed buried soils or organic-rich deposits were evident in this trench.

Appendix F

Sites Recorded on Air Photographs Listed by Morphological Type

Tweed Block

1. Ring ditches – cropmarks
2. Curvilinear palisades – cropmarks
3. Forts and defended settlements – multivallate, curvilinear – earthworks & cropmarks.
4. Forts and defended settlements – multivallate, rectilinear – cropmarks
5. Rectilinear palisades – cropmarks
6. Single-ditched, curvilinear enclosures – cropmarks & earthworks
7. Single-ditched, rectilinear enclosures – cropmarks
8. Curvilinear ditched enclosures with two, wide-spaced ditches – cropmarks
9. Rectilinear ditched enclosures with two, wide-spaced ditches – cropmarks
10. Pit alignments – cropmarks
11. *Grubenhaüser* – cropmarks

Till Block

12. Probable burial cairns – upstanding monuments
13. Cairnfields – upstanding
14. Settlements of unenclosed round houses – earthworks
15. Ring ditches – cropmarks
16. Curvilinear palisades – cropmarks
17. Hillforts & defended settlements – univallate – earthworks
18. Hillforts & defended settlements – multivallate, curvilinear – earthworks & cropmarks
19. Rectilinear enclosures with two, close-spaced ditches (ie defensive) – cropmarks
20. Late prehistoric and R/B stone-built settlements – earthworks
21. Single-ditched, curvilinear enclosures – cropmarks
22. Single-ditched, rectilinear enclosures – cropmarks
23. Pit alignments
24. *Grubenhaüser* – cropmarks

TWEED BLOCK

1. Ring ditches – cropmarks

NT 83 NW		
1382429	NT 8382 3665	Ring ditch, 10m in diameter. The ditch is up to 2m broad.
1382477	NT 8296 3852	Possible ring ditch, 11m in diameter.
NT 83 NE		
1383991	NT 8892 3849 NT 8871 3852	Ring ditch, 9m in diameter, defined by a narrow slot less than 1m wide. Probably a round house of ring-groove construction rather than a burial monument. Adjacent to the S is a disc-shaped mark of solid tone perhaps representing a second round house of different construction. A possible ring ditch, 7m in diameter.
1384053	NT 8652 3664	Ring ditch, 26m in diameter. More likely a burial or ceremonial monument than an unenclosed round house.
NT 84 NE		
1383293	NT 8992 4677	A possible ring ditch, 35m in diameter.
1383400	NT 8925 4704 NT 8952 4714 NT 8954 4717 NT 8937 4738	Probable ring ditch, *c*.10m in diameter. Possible ring ditch, *c*.8m in diameter. Doubtful ring ditch, less than 10m in diameter. Segment of possible ring ditch ?
1383408	NT 8916 4549 NT 8922 4540 NT 8909 4532 NT 8924 4545 NT 8914 4534 NT 8904 4542	Sub-circular ring ditch, *c*.12–15m in overall diameter. Two segments of a (hengiform ?) ring ditch, *c*.10m in overall diameter. Ring ditch, *c*.8m in overall diameter. The presence of a central pit suggests a burial. Segments of two, or more, ring ditches with diameters smaller than 8m. In at least two cases the presence of centrally placed pits suggest burials. Two ring ditches with diameters of *c*.6m and 12m. The presence of centrally placed pits suggests that these are burials. Penannular ditch, *c*.8m in diameter overall.
1383413	NT 8889 4524 NT 8890 4522 NT 8871 4529	Ring ditch, *c*.27m in diameter overall and formed by a ditch *c*.2m broad. An apparent break in the SE sector may not be original. The presence of a centrally placed pit suggests that this is a burial monument. Ring ditch, *c*.7m in diameter overall. A double ring ditch formed by two concentric ditches with overall diameters of *c*.11m and 7m. The ditches are separated by an interval of *c*.1m. The presence of a centrally placed pit suggests that this is a burial monument.
NT 84 SE		
1385170	NT 8740 4326	A sub-circular ring ditch with an overall diameter of *c*.16m.
1385190	NT 8870 4437	Two arcs of a probable ring ditch with an estimated diameter of 40–45m. In 1905 7 burial cists were discovered on this site which must therefore be identified as a burial monument.
NT 94 NW		
4034	NT 9137 4935	A ring ditch with an overall diameter of *c*.11m is defined by a ditch less than 1m broad.
NT 95 SW		
1383264	NT 9410 5180	Low House West. At least 8 ring ditches or disc-shaped marks of solid tone, probably representing unenclosed house platforms, are strung out in line along the contour. One house platform (at NT 9404 5184) appears to be cut by a pit alignment.
NU 05 SW		
1384219	NU 0047 5056	A possible ring ditch, *c*.5m in diameter.
1384222	NU 0070 5024	A possible ring ditch, less than 5m in diameter.

2. Curvilinear palisades – cropmarks

NT 84 NE		
1383408	NT 8918 4537	Groat Haugh East. Sub-circular palisaded enclosure, 68m in diameter containing an area of 0.38ha. There are opposed entrances facing NNW and SSE. At the SSE entrance the palisade trench is inturned.
NT 84 SE		
1385178	NT 8844 4130	Stickle Heaton South. Curvilinear or polygonal on plan. The perimeter is incomplete but its max. internal diameter can be estimated at *c*.47m giving an internal area of 0.17ha.
1385226	NT 8752 4016 NT 8771 4025	Cramondhill NE 1. Sub-circular palisaded enclosure with a maximum diameter of 32m and internal area of 0.28ha. Cramondhill NE 2. Sub-circular palisaded enclosure with a maximum diameter of 24m and internal area of 0.18ha.
NT 94 NW		
4038	NT 9454 4585	Shoresdean. Sub-circular palisade partly destroyed by a later bell pit. The perimeter measures *c*. 30m in diameter giving an internal area of 0.05ha. Situated off centre within it is the foundation trench of a circular timber house *c*.11m in diameter.

3. Hillforts and defended settlements – multivallate, curvilinear – earthworks and cropmarks

NT 83 NW		
1167	NT 8295 3607	Pressen Hill. Cropmark. Sub-oval on plan. The enclosure is formed by two, close-spaced ditches on N & W sides and by four ditches on the S & E. There are staggered entrances on the NE and SW facing sides. The enclosure has maximum internal dimensions of 85 × 70m. and an internal area of 0.48ha.
NT 83 NE		
1109	NT 8807 3540	Castle Hill. Earthwork and cropmark. Sub-oval plan. There are two ramparts on the N side and 3 ramparts and three ditches on S. The enclosure has maximum internal dimensions of 100 × 50m and an internal area of 0.42ha.
1384031	NT 8758 3590	East Moneylaws West. Cropmark. Sub-circular on plan. The perimeter is formed by a fragmentary inner ditch with short arc of second, close-spaced ditch on SE-facing side. There is an entrance in the SE-facing side. The internal area is estimated at 0.48ha.
NT 84 NE		
1340336	NT 8846 4506	Groat Haugh. Cropmark. The fort occupies a cliff edge position. The defences are formed by 4 arcs of ditch, 6–11m apart, with two intervening lines of palisade (?). No estimate of the internal area is presently possible.
NT 84 SE		
1397	NT 8849 4194	Stickle Heaton. Cropmark. Irregular curvilinear plan. The main enclosure is formed by two, or three, close-set ditches. It has maximum internal dimensions of 85 × 50m and an internal area of 0.3–0.4ha. There is an annexe on the SE side which is entered directly from the main enclosure. The annexe has an internal area of *c*.0.3ha.
1401	NT 8599 4020	Cornhill. Cropmark. Egg-shaped on plan. The defences are formed by two ditches set 3–8m apart. There are simple entrances in the NE and SE facing sides. The enclosure measures 160 × 105m internally and has an internal area of 1.38ha. Inside are two additional (later ?) enclosures – one circular and one rectilinear.
1405	NT 8911 4302	Mill Hill 1. Cropmark. Cliff edge position. The enclosure is formed by two semi-circular arcs of ditch (or palisade ?) set 12m apart. On the W side it overlaps (underlies ?) with a rectilinear enclosure. No estimate of the internal area is possible.
1385188	NT 8863 4359	Twizel Smithy. Cropmark. D-shaped plan. The enclosure is formed by two ditches set 5–10m apart. An entrance through both ditches is visible on E-facing side. The enclosure has maximum internal dimensions of 45 × 35m and an internal area of 0.14ha.

1385197	NT 8879 4442	Riffington Hill. Cropmark. The N half of the enclosure is formed by two concentric arcs of ditch set 10–13m apart. An entrance through both ditches is visible on the NE facing side. The enclosure has a maximum internal diameter estimated at *c*.80m.
NT 94 NW		
4025	NT 9004 4505	Whidden Hill 1. Cropmark. Sub-oval or polygonal plan. The enclosure is formed by two ditches set *c*.8m apart. Its maximum internal dimensions are estimated at 90 × 50m and it contains an area estimated at 0.37ha.
4037	NT 9429 4574	Bleak Ridge. Cropmark. Circular plan. The enclosure is formed by two concentric ditches set 12m apart. The inner ditch has an estimated maximum diameter of *c*.65m. and contains an area estimated at 0.34ha. An entrance through the outer ditch is visible on the NW facing side. To the N, E and W the enclosure is encircled by a boundary ditch more than 1km long.
4050	NT 9330 4716	East Newburn. Cropmark. Oval plan. The S half of an enclosure is formed by two concentric ditches set 7m apart. It has minimum internal dimensions of 85 × 40+m. and encloses an area > 0.31ha.
138290	NT 9113 4520	Grindon North. Cropmark. Sub-circular plan. The enclosure is formed by two roughly concentric ditches set 5–10m apart. It has maximum interior dimensions of *c*.45 × 35m. and an internal area of 0.13ha. The positions of two possible round houses are visible within.
1383327	NT 9459 4730	Shoreswood Loan. Cropmark. Irregular sub-circular plan. The enclosure is formed by two ditches which are only partly concentric and set 13–15m apart. No entrance is apparent. It has maximum interior dimensions of 60 × 50m and an internal area of 0.28ha. One interior round house is visible.
NT 95 SW		
4310	NT 9353 5113	Union Bridge. Cropmark. Cliff edge position. The enclosure is formed by three ditches set 4–10m apart. No entrance is visible. The internal area is estimated at 0.35ha.
NT 95 SE		
4216	NT 9673 5149	Canny Shiel. Earthwork. The enclosure is sited on a promontory where the Canny Burn flows into the Tweed. It is formed by two banks separated by a berm 8m broad and there is an external ditch. The internal area is >2ha. Previously thought to be of mediaeval date but may have earlier origins ?
4224	NT 9745 5470	Camphill. Cropmark. Sub-circular plan. The enclosure is formed by three concentric ditches set 5–10m apart. The outer ditch is markedly broader than the inner two. It has interior dimensions of *c*. 55m × 55m and an internal area of *c*.0.2ha. On the S side of the enclosure is a rectilinear annexe formed by a single ditch. The annexe has internal dimensions of 110 × 30–40m and an internal area of *c*.0.4ha. The annexe contains two possible round house sites.
4227	NT 9678 5480	Halidon Hill. Cropmark. D-shaped plan. The enclosure is formed by two concentric ditches and an intervening bank. There are two entrances in SE and SW corners. The enclosure has internal dimensions of *c*.70 × 50m and contains an area of 0.26ha. Linear ditches and double-ditched trackways lead from both entrances.
4272	NT 9575 5279	Whiteadder Bridge. Cropmark. Sub-circular plan. The enclosure is formed by two roughly concentric ditches set *c*.10m apart. The outer ditch is markedly broader than the inner one. Entrances are visible through the outer ditch in the SE & SW quadrants. The enclosure has maximum internal measurements of *c*.80m × 70m and an internal area of 0.48ha.
1384294	NT 9842 5473	Conundrum S. Cropmark. Circular or D-shaped plan ? Only the W side of enclosure is visible and is represented by two semi-circular arcs of ditch set 9m apart. The maximum internal diameter of the enclosure is estimated at *c*.75m.
1384297	NT 9552 5371	Baldersburyhill. Cropmark. Only the W side of the enclosure is visible and is represented by two roughly concentric arcs of ditch set 8–10m apart interrupted by a staggered entrance. No estimate of the internal area is possible.
1384335	NT 9900 5061	Prior House 1. Cropmark. Sub-circular plan. The enclosure is formed by two concentric ditches set 5–9m apart. An entrance through both ditches is visible on the NE-facing side. The enclosure has a maximum internal diameter of *c*.40m and contains an area of 0.12ha. On W side it overlaps with a (later ?) single-ditched oval enclosure.
NU 05 SW		
6554	NU 0011 5064	Springhill. Cropmark. Only the E side of the enclosure is represented by two concentric arcs of ditch set *c*.10m apart. No estimate of its dimensions or internal area is possible.

4. Hillforts and defended settlements – multivallate, rectilinear – cropmarks

NT 83 NE		
1122	NT 8921 3631	Branxton Hill South. Rectilinear on plan. The enclosure is defined by two strictly parallel ditches set c. 5m apart. The interior space measures 105 × 70m and has an area of 0.67ha. There are entrances through both ditches at two points on the SE-facing side close to the SE & SW corners. Within the enclosure there are traces of three or more round houses. Round the outside of the enclosure there are fragmentary signs of a third, narrow ditch perhaps forming an external corral or annexe. Additionally, two linear ditches form antenna-like projections extending outwards beyond the two entrances. These may form part of a system of ditched boundaries to the S.
1127	NT 8775 3634	East Moneylaws North. Sub-rectangular on plan. The enclosure is formed by two (or perhaps three) more or less parallel ditches. There is an entrance on NW facing side. The middle ditch encloses a space measuring *c*.100 × 75m and contains an area of *c*.0.7ha. The spacing between the ditches varies from 15–25m. On the N side the outermost ditch diverges to form a subsidiary enclosure or annexe.
1134	NT 8716 3979	Cramondhill 1. Strictly rectilinear on plan. The enclosure is formed by two, or possibly three, parallel ditches enclosing a space measuring *c*.60 × 45m with an area of *c*.0.26ha. One possible round house is visible in the interior.
NT 84 SE		
1383741	NT 8702 4012	Cramondhill North. Sub-rectangular on plan. The enclosure is formed by two ditches spaced 10–20m apart. On the S & E sides the outer ditch diverges from the inner ditch suggesting that the two may not be contemporary. The inner enclosure has maximum internal dimensions of 70 × 65m and encloses an area of 0.44ha. There is a probable entrance in the E-facing side of the inner ditch and another in the SE angle of the outer ditch.
1385175	NT 8820 4089	Melkington. Rectangular on plan. The enclosure is formed by two parallel ditches set 8–12m apart. The space enclosed by the inner ditch measures 45 × 50m and has an area of 0.2ha. There is a staggered entrance through both ditches on the NE-facing side.
NT 94 NW		
4036	NT 9164 4576	Battle Moor. Sub-square on plan. The enclosure is formed by two parallel ditches spaced 8–13m apart. There is an entrance through both ditches in the centre of the E-facing side. The inner ditch encloses a space measuring 65 × 60m and contains an area of 0.34ha.
4041	NT 9085 4626	East Newbiggin. Rectangular on plan. The enclosure is formed by two strictly parallel ditches spaced 7–10m apart. There are opposed entrances through both inner and outer ditches in the centre of the E and W facing sides. The inner ditch encloses a space measuring 65 × 55m and contains an area of 0.33ha.
4045	NT 9106 4861	Greenhill 1. Pentagonal on plan. The enclosure is formed by two strictly parallel ditches spaced 8–10m apart. There is an entrance through both ditches at the point where the two E-facing sides converge. The interior space has maximum dimensions of 50 × 55m and an area of 0.21ha.
NT 95 SW		
4308	NT 9313 5015	Horncliffe. Presumed rectangular on plan. Three parallel ditches form the SE and SW facing sides of an enclosure situated at the top of a steep slope. There is an entrance centrally placed in the SE facing side. On the W side of the entrance the middle and outer ditch project outwards to form a protective hornwork. This site has also been described as a Roman fortlet though this identification has not received support from Roman military specialists.

5. Rectilinear palisaded enclosures – cropmarks

NT 84 NE		
1344	NT 8992 4630	Norham South. A rectangular palisaded enclosure with internal dimensions of 40 × 40m and an internal area of 0.16ha.
NT 94 NW		
4049	NT 9000 4554	Fox Covert. A sub-rectangular palisaded enclosure with internal dimensions of *c*.30 × 35m and an internal area of 0.08ha. A break in the perimeter on the NW facing side may represent an entrance.

6. Single-ditched, curvilinear enclosures – cropmarks and earthworks

NT 83 NE		
1121	NT 8576 3510	Hagg Crossing. Cropmark. A sub-oval or egg shaped enclosure is bisected by a railway cutting. Internally it has maximum dimensions of *c*.130 × 70m giving an estimated internal area of *c*. 0.45ha. There is an entrance in the E facing side. Defensive ?
1124	NT 8950 3844	West Lodge. Cropmark. The W half of sub-circular (?) enclosure is visible. It has a maximum diameter of *c*.50m internally and contains an area of *c*.0.2ha.
1130	NT 8960 3668	Branxton Hill East. Cropmark. Oval on plan with maximum dimensions of 60 × 70m internally conatining an area of 0.26ha. There is a S facing entrance with projecting ditches on either side producing a funnel-like approach. In the interior are several possible round house sites.
1384039	NT 8978 3601	Branxtonmoor 2. Cropmark. Sub-oval on plan with maximum internal dimensions of *c*.40+ × 55m. containing an area estimated at *c*.0.18ha. A linear ditch extends for 700m to the N of the enclosure.
NT 83 NW		
1382432	NT 8465 3546	Brown Rigg 2. Cropmark. An irregular oval on plan with estimated max. dimensions 40 × 60m. Immediately to the SE is a rectilinear enclosure.
1382486	NT 8458 3717	Lightpipehall. Cropmark. N half of oval (?) enclosure. There are possible traces of second, close-spaced ditch to the E Probable entrance in the W facing side. It has internal dimensions of 160 × 50+ m and contains an estimated area of > 0.35ha ?
NT 84 SE		
1401	NT 8593 4017	Cornhill. Cropmark. Circular on plan. The enclosure is formed by a continuous (?) ditch. *c*. 47m in diameter and contains an area of 0.18ha. It is situated within the defences of (an earlier ?) hillfort. Off centre within the ditch is a possible round house.
1383738	NT 8689 4150	Donaldson's Lodge. Cropmark. Oval or polygonal on plan with a maximum likely diameter of 140m and an estimated internal area *c*.1.4ha. Defensive ?
1385183	NT 8860 4231	Buckie House West. Cropmark. Sub-oval on plan. it has internal dimensions of 35 × 42m and an internal area of 0.13ha. There is an entrance in S facing side. The enclosure is formed by a broad ditch with a hint of an external palisade trench.
NT 94 NW		
4009	NT 9192 4909	Greenhill 5. Earthwork. A promontory has been cut off by a broad crescent shaped ditch. The status of this ditch as a man made feature has been questioned in the past but should now be re-examined. To the E of the ditch the boundaries of the supposed site are defined by natural slopes. The 'enclosure' so formed has an internal area of 0.70ha.
4042	NT 9080 4522	West Burn 1. Cropmark. Sub-circular on plan with a maximum internal diameter of 40m and an internal area of 0.12ha. There is a possible entrance in SE facing side. A rectilinear ditched enclosure (West Burn 2) is immediately adjacent to the SW.
4044	NT 9164 4913	Green Hill 3. Cropmark. Irregular on plan. The perimeter is formed by both straight and curving lengths of ditch. An entrance faces NE. The enclosure has maximum internal dimensions of 55 × 70m and an internal area of 0.27ha. It contains two possible round houses.

4051	NT 9131 4817 NT 9134 4821	Norham West Mains 1. Cropmark. The enclosure is formed by both straight and curving lengths of ditch. It has maximum internal dimensions of 55 × 60m and contains an area of 0.27ha. No entrance is visiable. To the N is a curvilinear enclosure which may, or may not, be contemporary. Norham West Mains 2. Cropmark. Sub-circular on plan. The perimeter is formed in part by two close-set ditches which, though not necessarily contemporary, may perhaps have had a defensive function. The enclosure has internal dimensions of 35 × 40m and contains an area of 0.12ha. No entrance is visible. On the E side, the inner perimeter ditch projects northwards as a field (?) boundary. Immediately to the S is a rectilinear ditched enclosure whose relationship to this enclosure is unclear.
1360807	NT 9065 4750	Norham Castle. Earthwork. Recent survey suggests that the Norman castle occupies the site of a promontory fort constructed in the angle where the Mill Burn runs into the Tweed. Here a massive rampart and external ditch cut off the approach from the E. The area contained by the defences is estimated to be of the order of 6.6ha.
1383282	NT 9062 4670	Watch Law 1. Cropmark. Irregular egg shape on plan. The perimeter is formed by a single ditch and the enclosure has estimated maximum internal dimensions of *c*.35 × 45m and contains an area of 0.12ha. An entrance is visible in the NW facing side.
1383282	NT 9012 4660	Watch Law 2. Cropmark. Sub-circular on plan. The perimeter is represented by two semi-circular lengths of ditch. The enclosure has a maximum internal diameter of *c*.38m and an estimated internal area of 0.11ha.
1383301	NT 9150 4612	Rutchey Burn. Cropmark. Only the northern half of the enclosure is visible. It measures *c*.45m E-W internally and has an internal area > 0.1ha.
1383333	NT 9093 4725	Morris Hall. Cropmark. Sub-circular or oval on plan ? Only the NE sector is visible. It has a maximum internal diameter *c*.50m and an estimated internal area of *c*.0.2ha.
NT 95 SW		
4309	NT 9400 5154	West Loanend. Cropmark. Strictly circular on plan with an internal diameter of 37m. The perimeter is formed by a ditch beyond which are sections of what may be a second ditch or palisade concentric with the first. There is a clearly marked entrance in the SE facing quadrant. The interior has an area of 0.10ha and is occupied by a disc shaped mark of solid tone 25m in diameter representing the site of one or more round houses.
NT 95 SE		
4233	NT 9660 5352	White Damhead Burn. Cropmark. Sub-circular on plan with a max. internal diameter of 72m. The enclosure is situated on the edge of a bluff overlooking a stream. No entrance is visible. Its internal area is estimated at 0.4ha.
1384335	NT 9898 5062	Prior House 2. Cropmark. Oval on plan. The perimeter is formed by a single ditch (or palisade ?). The enclosure has maximum internal dimensions of *c*.30 × 40m and its internal area is estimated at 0.08ha. It overlies, or is overlain by, a double-ditched defended settlement.
1384384	NT 9815 5468	Loanend E. Cropmark. Incomplete oval on plan. The perimeter is formed by single ditch with maximum internal dimensions of *c*.40 x 50m. Its internal area is estimated at 0.18ha. No definite entrance can be identified.
1384402	NT 9884 5063	Prior Hill W. Cropmark ? A possible oval or sub-circular ditched enclosure has been identified on a 1951 RAF air photograph (9/10/51). The status of this site is uncertain but it appears to have internal dimensions of *c*.30 × 40m and an internal area of 0.08ha.

7. Single ditched rectilinear enclosures – cropmarks

NT 83 NE		
1125	NT 8862 3524	Moneylaws Covert. Trapezoidal on plan with possible entrances in the NE and SE facing sides. The enclosure has internal dimensions of *c*.45 × 50m and an internal area of 0.20ha.
1126	NT 8673 3797	English Strother. Sub-square on plan with maximum internal dimensions of *c*.40 × 45m and an internal area of 0.18ha. There is a probable entrance in E facing side.
1128	NT 8695 3626	Tithe Hill. The enclosure is incompletely visible but seems to be trapezoidal on plan. It has maximum internal dimensions of *c*.30 × 30m and an estimated internal area 0.10ha.
1134	NT 8718 3969	Cramondhill 2. Sub-rectangular on plan. The enclosure is incompletely visible but its maximum internal dimensions are estimated at *c*.45 × 55m with an internal area of 0.26ha.
1383998	NT 8890 3822	Crookham Westfield. E half of a rectangular enclosure recorded. Entrance in the centre of E-facing side. Minimum dimensions 50 × 55m with internal area > 0.25ha. One probable round house within. Separate enclosure or annexe with internal area > 0.1ha conjoined on S side. Complex of small enclosures close by to the NE.
1384002	NT 8974 3838	Pallinsburn House South. Incompletely recorded but sub-rectangular on plan. Entrance in centre of S facing side. Internal dimensions estimated at *c*. 35 × 45m with internal area of *c*. 0.16ha.
1384009	NT 8769 3737	Marl Bog. Sub-rectangular on plan with maximum internal dimensions of 90 × 110m and an internal area of 0.91ha. There is a clearly marked entrance in the centre of the E facing side. One possible G*rubenhaus* (or pit ?) is located inside the enclosure. Ditched boundaries to the N and E may be related.
1384015	NT 8990 3608	Branxton Moor 1. Sub-rectangular or D-shaped on plan. The internal dimensions of the enclosure are estimated at 40 × 45m giving an internal area of 0.12ha.
1324087	NT 8730 3544	West Moneylaws. The SW and SE sides of a probable rectangular enclosure are visible. There is an entrance in the SE facing side.
1384050	NT 8802 3828	Barelees SE. Three sides of a possible rectilinear enclosure are visible. It has minimum internal dimensions of 55 × 75+m and contains an area >0.4ha.
NT 83 NW		
1157	NT 8333 3833	Wark East. Three sides of a probable rectangular enclosure are visible. There is an entrance in the E facing side. The enclosure has internal dimensions of 45 × 60+m and contains an area of at least 0.27ha. A boundary ditch to the N may be associated.
1382432	NT 8456 3543	Brown Rigg 1. Part of a rectilinear enclosure is visible. It has minimum internal dimensions of 35 × 60m and contains an estimated area of *c*. 0.22ha.
1382637	NT 8323 3795	Lamb Knowe. A trapezoidal enclosure with maximum internal dimensions of *c*.18 × 28m and an internal area of 0.04ha.
NT 84 NE		
1338	NT 8987 4526	Whidden Hill 2. A sub-square enclosure with internal dimensions of 30 × 30m and containing an area of 0.07ha. There is an entrance in the centre of the W facing side. A round house is centrally placed within the enclosure.
NT 84 SE		
1376	NT 8748 4211	Haly Chesters. Trapezoidal on plan with an entrance in the centre of the NE facing side. The enclosure has maximum internal dimensions of 60 × 70m and contains an area of 0.37ha. There are traces of a possible second, close set ditch on the SE side.
1401	NT 8598 4019	Cornhill. Rectangular enclosure situated within the defences of a hillfort. There is an entrance in the centre of the S facing side. The enclosure has internal measurements of *c*.45 × 45m and contains an area of 0.20ha.
1403	NT 8666 4220 NT 8671 4253 NT 8679 4264 NT 8682 4270	West St Cuthberts. Rectangular enclosure with an entrance in the centre of the E facing side. It has internal dimensions of *c*.35 × 40m. and contains an area of 0.16ha. Chapel Stream 3. An incomplete rectangular (?) enclosure. Its dimensions and internal area cannot be estimated. Chapel Stream 1. Rectangular enclosure with internal dimensions of *c*.40 × 50m containing an area of 0.20ha. There is an entrance in the centre of the NE facing side. On the NE side it abuts a further enclosure (Chapel Stream 2) Chapel Stream 2. Rectangular on plan with internal dimensions of 45 × 55m and an internal area of 0.22ha. On the SW side it abuts a further enclosure (Chapel Stream 1).

1405	NT 8900 4300	Mill Hill 2. Incomplete rectangular (?) enclosure on a cliff edge site. The enclosure measures *c*.100m SW-NE and intersects with a defended curvilinear fort or settlement.
1406	NT 8736 4263 NT 8751 4269	East St Cuthberts 1. An incomplete rectangular enclosure with internal measurements of *c*.40 × 43m. and containing an area estimated at *c*.0.16ha. There is a probable entrance in the centre of the NE facing side. East St Cuthberts 2. Sub-rectangular plan with an entrance in the centre of the NE facing side. The enclosure has internal measurements of *c*.38 × 55m and contains an area of 0.18ha. An patch of dark tone, presumably indicative of occupation, extends over the whole of the interior within the line of an assumed internal bank.
1385201	NT 8935 4436	Shellacres. Three sides of an incomplete rectangular (?) enclosure. No entrance is apparent. The enclosure has maximum likely internal dimensions estimated at *c*.40 × 45m giving an internal area of *c*.0.17ha.
1385207	NT 8943 4456 NT 8963 4469 NT 8975 4465 NT 8974 4481 NT 8979 4484	Tillmouth Farm E. Incomplete sub-rectangular enclosure with an irregular plan. It has maximum internal dimensions of *c*.50 × 85m and an internal area *c*.0.4ha. There is a probable entrance on the W facing side. The ditch marking the N side of the enclosure is prolonged to the W where it forms one of a series of linear boundaries. Wideopen Plantation 1. Trapezoidal enclosure with an entrance in the centre of the E facing side. The enclosure has maximum internal dimensions of *c*.40 × 45m and an internal area of 0.16ha. Wideopen Plantation 2. Sub-square enclosure. The enclosure ditch appears continuous and no entrance is apparent. It has internal measurements of *c*.30 × 30m and contains an area of 0.14ha. Wideopen Plantation 3. Trapezoidal enclosure with entrance in the centre of the W facing side. The enclosure has maximum interior dimensions of *c*.40 × 45m and contains an area of 0.15ha. It has one side in common with Wideopen Plantation 4. Wideopen Plantation 4. Sub-rectangular enclosure with an entrance in the centre of the NE facing side. The enclosure has maximum interior dimensions of *c*.35 × 48m and contains an area of 0.14ha. On the SW side the enclosure is conjoined with Wideopen Plantation 3.
1385231	NT 8867 4395	Bog Plantation. Incomplete sub-rectangular (?) enclosure with estimated internal dimensions of *c*.65 x 75m and a min. internal area of c. 0.44ha.
NT 94 NW		
4042	NT 9072 4518	West Burn 2. Incomplete rectangular (?) enclosure. A curvilinear, single ditched enclosure, West Burn 1, lies close by to the E.
4043	NT 9240 4913	NW Norham East Mains 1. Sub-rectangular ditched enclosure with an entrance in the SE facing side. The enclosure measures *c*.50 x 55m internally and contains an area of 0.25ha. On the N side, the enclosure ditch is extended to the E and W where it forms one side of a large, three sided enclosure or field.
4046	NT 9113 4883	Greenhill 2. Rectangular enclosure with a probable entrance in the E facing side. The enclosure measures *c*.35 × 45m internally and contains an area of 0.14ha. A second ditch outside the enclosure to the N forms a small, elongated annexe (?).
4047	NT 9145 4911	Greenhill 4. Irregular polygon on plan. The perimeter is formed by straight and curving lengths of ditch. There is an entrance in the SE facing side. The enclosure has maximum internal dimensions of 60 × 65m and contains an area of 0.32ha.
4048	NT 9171 4808	East Norham West Mains. Rectangular on plan with a probable entrance off centre in the E facing side. The enclosure has maximum internal dimensions of 55 × 65m and contains an area of 0.32ha.
1383298	NT 9146 4526	Battle Moor South. Sub-rectangular on plan. Two sections of the perimeter are not visible. The enclosure has maximum. internal dimensions of *c*.65 x 95m and contains an area of *c*.0.55ha.
1383311	NT 9285 4872	Norham East Mains. Sub-square on plan. The enclosure has internal dimensions of 35 × 35m and contains an area of 0.11ha. There is a possible entrance in the E facing side.
1383314	NT 9258 4890	NW Norham East Mains 3. Sub-rectangular plan. The perimeter is defined by a broad ditch without any apparent break. The enclosure has internal measurements of *c*. 50 × 60m and contains an area of 0.27ha. Within the assumed line of the enclosure bank, the interior is occupied by a dark mark of solid tone presumably indicative of occupation.

NT 95 SW		
4305	NT 9344 5002	Horncliffe. SE portion of a rectangular (?) enclosure. There is an entrance in the centre of the SE facing side. The enclosure has minimum internal dimensions of *c*.60m × 50+m. Boundary ditches to the SE may be associated ?
1383266	NT 9485 5164	West Ord 2. S & E sides of a rectangular (?) enclosure. No entrance is visible. Boundary ditches to the SE may be associated ?
NT 95 SE		
4273	NT 9596 5356 NT 9587 5351	SE Baldersburyhill 1. Rectangular on plan. The perimeter is defined by a narrow ditch with internal dimensions of *c*. 50m × 60m containing an area of 0.26ha. There is a possible entrance in SE facing side. Two large pits are visible – one inside and one just outside the enclosure. There are boundary ditches to the E, S, and W. A second enclosure is situated nearby to the SW. SE Baldersburyhill 2. Sub-rectangular on plan with somewhat curving sides. There is a probable entrance in the SE facing side. The enclosure has internal dimensions of *c*.65 × 80m and contains an area of 0.45ha.
4278	NT 9510 5163	West Ord 1. Square on plan. The enclosure measures only *c*.20 × 20m and contains an area of 300 m^2 . Possibly a barrow rather than a settlement ?
1384299	NT 9733 5328	High Letham S. Sub-rectangular on plan with an entrance in the centre of the SE facing side. The enclosure has internal dimensions of *c*.55 × 65m and contains an area of 0.34ha. To the N is a curving ditch which may represent an annexe or else part of a separate enclosure.
1384305	NT 9802 5047	Ord Mains SE. Rectangular on plan with most of the E side unrecorded. The enclosure has estimated internal dimensions of *c*.40 × 45m and contains an area of 0.19ha. Ditches to N and S may be associated boundaries.
1384318	NT 9850 5020	South Ord. Rectangular (?) enclosure represented by parts of the NE and SE sides. There is an entrance in the SE facing side.

8. Single-ditched, curvilinear enclosures – cropmarks and earthworks

NT 83 NE		
1121	NT 8576 3510	Hagg Crossing. Cropmark. A sub-oval or egg shaped enclosure is bisected by a railway cutting. Internally it has maximum dimensions of *c.*130 × 70m. giving an estimated internal area of *c.*0.45ha. There is an entrance in the E facing side. Defensive ?
1124	NT 8950 3844	West Lodge. Cropmark. The W half of sub-circular (?) enclosure is visible. It has a maximum diameter of *c.*50m internally and contains an area of *c.*0.2ha.
1130	NT 8960 3668	Branxton Hill East. Cropmark. Oval on plan with maximum dimensions of 60 × 70m internally conatining an area of 0.26ha. There is a S facing entrance with projecting ditches on either side producing a funnel-like approach. In the interior are several possible round house sites.
1384039	NT 8978 3601	Branxtonmoor 2. Cropmark. Sub-oval on plan with maximum internal dimensions of *c.*40+ × 55m. containing an area estimated at *c.*0.18ha. A linear ditch extends for 700m to the N of the enclosure.
NT 83 NW		
1382432	NT 8465 3546	Brown Rigg 2. Cropmark. An irregular oval on plan with estimated max. dimensions 40 × 60m. Immediately to the SE is a rectilinear enclosure.
1382486	NT 8458 3717	Lightpipehall. Cropmark. N half of oval (?) enclosure. There are possible traces of second, close-spaced ditch to the E Probable entrance in the W facing side. It has internal dimensions of 160 × 50+ m and contains an estimated area of > 0.35ha ?
NT 84 SE		
1401	NT 8593 4017	Cornhill. Cropmark. Circular on plan. The enclosure is formed by a continuous (?) ditch *c.*47m in diameter and contains an area of 0.18ha. It is situated within the defences of (an earlier ?) hillfort. Off centre within the ditch is a possible round house.
1383738	NT 8689 4150	Donaldson's Lodge. Cropmark. Oval or polygonal on plan with a maximum likely diameter of 140m. and an estimated internal area *c.*1.4ha. Defensive ?
1385183	NT 8860 4231	Buckie House West. Cropmark. Sub-oval on plan. it has internal dimensions of 35 × 42m and an internal area of 0.13ha. There is an entrance in S facing side. The enclosure is formed by a broad ditch with a hint of an external palisade trench.
NT 94 NW		
4009	NT 9192 4909	Greenhill 5. Earthwork. A promontory has been cut off by a broad crescent shaped ditch. The status of this ditch as a man made feature has been questioned in the past but should now be re-examined. To the E of the ditch the boundaries of the supposed site are defined by natural slopes. The 'enclosure' so formed has an internal area of 0.70ha.
4042	NT 9080 4522	West Burn 1. Cropmark. Sub-circular on plan with a maximum internal diameter of 40m and an internal area of 0.12ha. There is a possible entrance in SE facing side. A rectilinear ditched enclosure (West Burn 2) is immediately adjacent to the SW.
4044	NT 9164 4913	Green Hill 3. Cropmark. Irregular on plan. The perimeter is formed by both straight and curving lengths of ditch. An entrance faces NE. The enclosure has maximum internal dimensions of 55 × 70m and an internal area of 0.27ha. It contains two possible round houses.
4051	NT 9131 4817 NT 9134 4821	Norham West Mains 1. Cropmark. The enclosure is formed by both straight and curving lengths of ditch. It has maximum internal dimensions of 55 × 60m and contains an area of 0.27ha. No entrance is visiable. To the N is a curvilinear enclosure which may, or may not, be contemporary. Norham West Mains 2. Cropmark. Sub-circular on plan. The perimeter is formed in part by two close-set ditches which, though not necessarily contemporary, may perhaps have had a defensive function. The enclosure has internal dimensions of 35 × 40m and contains an area of 0.12ha. No entrance is visible. On the E side, the inner perimeter ditch projects northwards as a field (?) boundary. Immediately to the S is a rectilinear ditched enclosure whose relationship to this enclosure is unclear.

1360807	NT 9065 4750	Norham Castle. Earthwork. Recent survey suggests that the Norman castle occupies the site of a promontory fort constructed in the angle where the Mill Burn runs into the Tweed. Here a massive rampart and external ditch cut off the approach from the E. The area contained by the defences is estimated to be of the order of 6.6ha.
1383282	NT 9062 4670	Watch Law 1. Cropmark. Irregular egg shape on plan. The perimeter is formed by a single ditch and the enclosure has estimated maximum internal dimensions of *c*.35 × 45m and contains an area of 0.12ha. An entrance is visible in the NW facing side.
1383282	NT 9012 4660	Watch Law 2. Cropmark. Sub-circular on plan. The perimeter is represented by two semi-circular lengths of ditch. The enclosure has a maximum internal diameter of *c*.38m and an estimated internal area of 0.11ha.
1383301	NT 9150 4612	Rutchey Burn. Cropmark. Only the northern half of the enclosure is visible. It measures *c*.45m E-W internally and has an internal area > 0.1ha.
1383333	NT 9093 4725	Morris Hall. Cropmark. Sub-circular or oval on plan ? Only the NE sector is visible. It has a maximum internal diameter *c*.50m. and an estimated internal area of *c*.0.2ha.
NT 95 SW		
4309	NT 9400 5154	West Loanend. Cropmark. Strictly circular on plan with an internal diameter of 37m. The perimeter is formed by a ditch beyond which are sections of what may be a second ditch or palisade concentric with the first. There is a clearly marked entrance in the SE facing quadrant. The interior has an area of 0.10ha and is occupied by a disc shaped mark of solid tone 25m in diameter representing the site of one or more round houses.
NT 95 SE		
4233	NT 9660 5352	White Damhead Burn. Cropmark. Sub-circular on plan with a max. internal diameter of 72m. The enclosure is situated on the edge of a bluff overlooking a stream. No entrance is visible. Its internal area is estimated at 0.4ha.
1384335	NT 9898 5062	Prior House 2. Cropmark. Oval on plan. The perimeter is formed by a single ditch (or palisade ?). The enclosure has maximum internal dimensions of *c*.30 × 40m and its internal area is estimated at 0.08ha. It overlies, or is overlain by, a double-ditched defended settlement.
1384384	NT 9815 5468	Loanend E. Cropmark. Incomplete oval on plan. The perimeter is formed by single ditch with maximum internal dimensions of *c*.40 × 50m. Its internal area is estimated at 0.18ha. No definite entrance can be identified.
1384402	NT 9884 5063	Prior Hill W. Cropmark ? A possible oval or sub-circular ditched enclosure has been identified on a 1951 RAF air photograph (9/10/51). The status of this site is uncertain but it appears to have internal dimensions of *c*.30 × 40m and an internal area of 0.08ha.

9. Rectilinear ditched enclosures with two, widely spaced ditches – cropmarks

NT 83 NW		
1382430	NT 8407 3660	Willow Burn. Cropmark. Two sides of a rectilinear (?) enclosure with an entrance in the E facing side. 50–70m to the E lies a right-angled segment of ditch which may represent part of a surrounding enclosure.
NT 94 NW		
4035	NT 9228 4882	NW Norham East Mains 2. Cropmark. A D-shaped enclosure with an entrance in the centre of the E facing side and an internal area of 0.11ha. The enclosure is almost completely surrounded, at a distance of between 15 and 30m, by a second ditch which encloses an area of 0.46ha.
NT 95 SE		
1384290	NT 9518 5477	Baitstrand W. Cropmark. Three sides of rectilinear ditched enclosure containing a minimum area of 0.23ha. Outside it, at a distance of 10–25m, is a second curvilinear ditch which may form a second, outer enclosure.

10. Pit alignments – cropmarks

NT 83 NE		
1383991	NT 8883 3874 NT 8883 3877 NT 8894 3881	Three lengths of pit alignment, none more than 20m long.
1384059	NT 8919 3594 to NT 8949 3594	Pit alignment, *c.*200m in length, and running E-W. Appears to form one element in larger system of sub-rectangular fields or 'ranch' boundaries which are otherwise defined by linear ditches. At NT 8942 3596 the pit alignment comes to a T-junction with a linear ditch which runs NNE from this point. This boundary system may be associated with the rectilinear hillfort at Branxtonhill South (NT 8921 3631; 1122).
NT 84 NE		
1383408	NT 8902 4539 NT 8910 4545	Pit alignment *c.*60m long and curved at its E extremity. It is partially overlain by the ditch of a Roman temporary camp A row of seven large pits, *c.*25m long.
NT 84 SE		
1406 1383744	NT 8757 4243 to NT 8778 4255 NT 8691 4027 to NT 8719 4040	Pit alignment traceable over a distance of *c.*250m. Individual pits are rectangular in plan. Pit alignment traceable over a distance of 310m. Less than 10m from its E extremity is the terminal of a linear ditch which is aligned at right angles to the pit alignment.
1385159	NT 8774 4201 to NT 8782 4217	Pit alignment traceable over a distance of 310m follows a curving line along the contour. Individual pits are rectangular in plan.
NT 95 SW		
1383264	NT 9396 5198 to NT 9431 5169	Pit alignment traceable over a distance of 490m. The pit alignment crosses a string of unenclosed round house platforms and may cut one of them (at NT 9404 5184; 1383264). Individual pits are sub-oval in plan and measure *c.*2m × 1m.
NT 95 SE		
4227	NT 9658 5498	S termination of a pit alignment which extends northwards into km square NT 9655 (unplotted).
1384309	NT 9820 5008 NT 9823 5011 NT 9840 5012 to NT 9834 5022	Centre point of a semi-circular arc of pits traceable over a distance of *c.*50m Centre point of a pit alignment *c.*80m in length. Pit alignment 120m in length.

11. ***Grubenhaüser*** **– cropmarks**

NT 83 NE		
1384009	NT 8773 3740 NT 8789 3735 NT 8785 3738	Marl Bog.Three possible *Grubenhaüser* situated within or near a large, sub-rectangular ditched enclosure.
NT 84 NE		
1383400	NT 8930 4732 NT 8935 4735 NT 8947 4725 NT 8952 4713	Norham West. Four possible *Grubenhaüser* form part of a large complex of cropmarks which includes ditched enclosures, linear ditches and numerous pits.
1383416	NT 8892 4502	Groat Haugh. A possible *Grubenhaus* with dimensions *c*.6m × 4m
NT 84 SE		
1385207	NT 8953 4461 NT 8955 4460	Tillmouth Farm NE. Two possible *Grubenhaüser* represented by sub-rectangular marks measuring *c*.4 × 2.5m
NT 94 NW		
4037	NT 9396 4567	Bleak Ridge W. A possible *Grubenhaus* measuring 6.5m square.
NT 95 SE		
1384309	NT 9818 5006	South Ord. A possible *Grubenhaus*
NU 05 SW		
1385153	NU 0033 5043	Springhill SE. A possible *Grubenhaus* measuring 5 × 4m.

TILL BLOCK
12. Probable burial cairns

NU 01 NW		
4962	NU 0470 1819	Cairn, 9m in diameter.
4986	NU 0322 1993	Cairn, 9m in diameter.
5215	NU 0052 1781	Kerbed cairn, 7m in diameter.
5221	NU 0054 1852	Reaveley Hill. Robbed kerbed cairn, 14m in diameter.
1033863	NU 0015 1575	Cairn, 9m in diameter.
1033866	NU 0007 1559	Cairn, 9m in diameter.
1033867	NU 0001 1504	Cairn, 16m in diameter ?
1033868	NU 0056 1562	Cairn, 15m × 14m.
1034449	NU 0022 1533	Cairn, 8.5m in diameter.
1034469	NU 0077 1564	Turf Knowe. Cairn, 11.5m in diameter. Excavated 1994–5.
NU 01 NE		
4893	NU 0887 1585	Titlington Pike. Cairn, 13m in diameter.
	NU 0875 1599	Titlington Pike. Cairn, 24m in diameter.
	NU 0881 1594	Titlington Pike. Cairn, 11m in diameter.
	NU 0875 1595	Titlington Pike. Cairn, 7.5m in diameter.
NU 02 NE		
5460	NU 0945 2773	Cairn, 12–15m in diameter.
5535	NU 0965 2810	Cairn, 16m in diameter.
5541	NU 0894 2617	Millstone Hill. 3 conjoined kerbed cairns, 4.5, 2.5, and 1.5m in diameter. Excavated 1976.
NU 02 SE		
5748	NU 0815 2230	Blawearie cairn. 11m in diameter. Excavated 1866 (Greenwell) and 1984–8 (Beckensall, 1996).
5758	NU 0808 2156	Tick Law. 2 adjacent cairns.
5763	NU 0885 2081 NU 0873 2058	Cairn, 7m in diameter. Cairn, 7.5m in diameter.
5774	NU 0827 2317	Cairn with exposed cist.
5791	NU 0718 2168	Cairn, 4m in diameter.
5807	NU 0835 2132	Cairn, 10m in diameter.
5831	NU 0789 2384	Cairn, 9m in diameter.
5838	NU 0856 2412	Cairn, 6m in diameter.
1380505	NU 0932 2300	Cairn, 9m in diameter.
1380659	NU 0814 2322	Cairn, *c*.5m in diameter.

13. Cairnfields – earthworks

NU 01 NW		
4950	NU 0020 1770	Reaveley Hill. Scattered cairns and linear clearance banks.
5090	NU 0045 1703	Reaveley Hill. 16+ clearance cairns.
5104	NU 0010 1760 NU 0070 1710	Reaveley Hill. 10+ clearance cairns. Reaveley Hill. 28 clearance cairns.
5221	NU 0060 1850	Reaveley Hill 1. 50+ clearance cairns in close proximity to a co-axial field system and one or more unenclosed round houses.
1034444	NU 0005 1583	Brough Law. 24 clearance cairns and linear banks.
1034457	NU 0001 1555	Brough Law. 5 clearance cairns.
1034459	NU 0031 1554	Brough Law. Clearance cairns and lynchets.
1034460	NU 0043 1571	Brough Law. 10+ clearance cairns.
1034490	NU 0065 1780	Reaveley Hill 2. *c*. 30 clearance cairns situated in close proximity to two unenclosed round houses.
NU 02 NE		
5541	NU 0890 2610	Millstone Hill. *c*. 85 clearance cairns (afforested).
5542	NU 0950 2770	Whinny Hill. 90+ clearance cairns.
5543	NU 0960 2630	Willie Law. 20+ clearance cairns.
1039049	NU 0920 2550	Ox Eye. 40+ clearance cairns in close proximity to one unenclosed round house (afforested).
1382037	NU 0842 2753	Whitecross Edge. 14 clearance cairns.
1382123	NU 0760 2670	Amersidelaw. 8+ clearance cairns (afforested).
NU 02 SE		
5774	NU 0830 2310	Bewick Moor. 23+ clearance cairns.
5837	NU 0770 2450	Hepburn Crags. 50+ clearance cairns in close proximity to a settlement of unenclosed round houses
5839	NU 0790 2480	Hepburn Crag Plantation. 60+ cairns in close proximity to an unenclosed round house.

14. Settlements of unenclosed round houses – earthworks

NU 01 NW		
5221	NU 0065 1841	Reaveley Hill 1. Unenclosed round house.
1033871	NU 0079 1783 NU 0075 1778	Reaveley Hill 2. Unenclosed round house. Reaveley Hill 2. Unenclosed round house.
1034442	NU 0001 1594	Brough Law. Possible unenclosed round house platform, *c.* 7.5m in diameter.
1034443	NU 0002 1596	Two possible unenclosed round house platforms.
1034447	NU 0017 1578	Possible unenclosed platform, 5.5m × 9.0m
1034462	NU 0052 1565	Turf Knowe. Unenclosed round house. Ring groove.
1034463	NU 0051 1570	Turf Knowe. Unenclosed round house.
1034466	NU 0053 1565	Turf Knowe. Unenclosed round house.
1034475	NU 0000 1605	Unenclosed hut circle, 4.5m internal diameter.
1034476	NU 0058 1628	Unenclosed hut circle, 4.1m internal diameter.
1381863	NU 0091 1816	Possible unenclosed round house (ring ditch), 8.0m in diameter.
1381865	NU 0122 1826	Unenclosed round house (ring bank), 10m in diameter.
1381937	NU 0101 1856	Unenclosed round house (platform). Maximum diameter, 19m.
NU 01 NE		
1378797	NU 0972 1849	Group of four unenclosed (?) round houses, up to 11.5m in diameter.
1378803	NU 0980 1827	Unenclosed round house, 11m in diameter.
NU 02 NE		
1039049	NU 0932 2530	Ox Eye. Unenclosed round house, 11m in diameter.
1382123	NU 0760 2672	Amersidelaw. Possible unenclosed round house (ring ditch), *c.*13m in diameter.
NU 02 SE		
5837	NU 0774 2434	Hepburn Crags. Group of 8 or 9 unenclosed round houses with associated stone clearance.
5838	NU 0847 2401	Harehope Burn 1. Group of three unenclosed round houses with cord rig cultivation in the near vicinity.
5839	NU 0790 2482	Hepburn Plantation.Unenclosed round house (ring bank), 14m in diameter.
1380497	NU 0926 2413	Harehope Burn 2. Unenclosed round house (ring bank), 13m in diameter.
1380502	NU 0895 2308	Possible hut circle, 8m in diameter ?
1380505	NU 0937 2295	Possible hut circle, 13m in diameter.
1380507	NU 0891 2247	Possible unenclosed hut circle, 6m in diameter.
1380519	NU 0994 2117	Possible unenclosed hut circle, 9m in diameter.
1380564	NU 0972 2151	Possible unenclosed round house (ring ditch), 8m in diameter.

15. Ring ditches – cropmarks

NU 01 NW		
1381876	NU 0489 1828 NU 0489 1834	Ring ditch, 10m in diameter. Ring ditch, 8m in diameter.
NU 01 NE		
1378759	NU 0707 1929	Sub-circular ring ditch, 8m in diameter (max.).
NU 02 SE		
5825	NU 0549 2025	Penannular ditch, 15m in diameter.
5828	NU 0558 2071 NU 0557 2052 NU 0547 2057	Ring ditch, 6m in diameter. Ring ditch, 6m in diameter. Adjacent to linear ditch. Ring ditch, 9m in diameter. Adjacent to linear ditch.
1380598	NU 0671 2488	Probable ring ditch, incompletely visible. *c.*25m in diameter with a break in the NE facing side. Possibly a funerary monument or a hengiform structure ?

16. Curvilinear palisades – cropmarks

NU 01 NW		
1381885	NU 0463 1804	East Brandon Hill. Egg-shaped on plan. The perimeter is formed by three lines of palisade set 2 to 5m apart. On the SE facing side there is a break in the two outer palisade lines which are slightly everted at this point. However, there is no corresponding break in the innermost palisade suggesting that at least two structural phases are present. The enclosure has interior dimensions of 85 × 95m and an internal area of 0.62ha.
1381940	NU 0291 1724	Heddon Hill. Two concentric arcs of palisade (or ditch ?), set 8 to 10m apart, are visible on the summit of Heddon Hill and it is possible that they originally formed part of an enclosed or defended settlement. Both features pre-date overlying broad rig cultivation.
NU 01 NE		
1378735	NU 0572 1953	Percy's Cross. An oval, twin palisaded enclosure is represented by concentric palisade lines set 8m apart. The innermost palisade has dimensions of *c.*40 × 50m and an internal area of 0.15ha. Breaks in both perimeters on the E and W facing sides probably represent opposed entrances. The palisaded enclosure is eccentrically placed within a larger ditched enclosure which may represent a later and more robust defensive circuit.
1378748	NU 0546 1666	Brandon. An arc of narrow trench marks what may be the S half of a circular (?) palisaded enclosure with an estimated diameter of 42m and internal area of 0.13ha.
1378750	NU 0659 1856	Gallow Law. Sub-circular palisaded enclosure with an estimated diameter of 43m and an internal area of 0.13ha.
1378768	NU 0856 1806	Beanley S. Sub-circular palisaded enclosure with an estimated maximum diameter of 45m and an internal area of 0.17ha. The NE sector is not visible as a cropmark.
NU 02 SE		
5843	NU 0538 2076	New Bewick North. A possible palisaded enclosure is represented by an almost circular cropmark 22m in diameter. This could perhaps mark a small homestead or, less probably, a large unenclosed round house.

17. Hillforts and defended settlements – univallate – earthworks

NU 01 NW		
4941	NU 0024 1960	Harelaw Burn. Earthwork and cropmark. The enclosure is formed by a semi-circular ditch with internal (?) and counterscarp banks and is sitted at the top of a steep slope overlooking a burn. The internal area is estimated at 0.28ha.
5043	NU 0090 1668	East Reaveley. A single walled enclosure with interior dimensions *c*.90 × 120m and an internal area of 0.95ha. Secondary enclosures of unknown date overlie the original earthwork.
5050	NU 0042 1682	Ewe Hill. A sub-oval walled enclosure with external annexes. At least two secondary (?) stone-built houses are visible in the interior.
1033874	NU 0114 1577	Ingram Hill. A circular enclosure with an internal diameter of 44m and an internal area of 0.16ha. Traces of an external ditch ? Excavation has demonstrated that the site began with palisade and that the succeeding embanked enclosure was also surmounted by a palisade. Five rectangular building foundations are visible in the interior.
NU 01 NE		
4848	NU 0916 1827	Beanley Moor. A circular bank with internal dimensions of 45 × 50m encloses an area of 0.19ha. There are possible entrances on both the E and W facing sides.
4905	NU 0847 1536	Shawdonwood House. Sub-circular on plan with slight traces of internal and external ditches. There is a possible annexe on the S side. The site has been mutilated by ploughing.
NU 02 NE		
5431	NU 0811 2532	Ros Castle. A sub-oval fort formed by a single rampart with an external ditch round the E perimeter. It measures 90 × 170m internally and contains an area of 1.24ha. There is an entrance in the E facing side and possibly another on the SW.
5505	NU 0701 2699	Low Thor Law. Sub-circular on plan with one, or possibly two, ramparts accompanied by internal and external ditches. The enclosure measures 52m internally and contains an area of 0.23ha.
NU 02 SE		
5711	NU 0612 2431	Hepburn Bell. Oval in plan and mutilated by later ploughing. The enclosure is formed by a single rampart with no visible sign of a ditch. The internal area is estimated at 0.24ha.
5716	NU 0743 2470	Hepburn Crags. Cliff edge position with a D-shaped plan. The enclosure is formed by a single rampart with an outer ditch on the E side only. There are entrances in both E and W sides. Internally it has maximum dimensions of 60 × 75m and contains an area of 0.31ha.

18. Hillforts and defended settlements – multivallate, rectilinear – cropmarks

NT 83 NE		
1122	NT 8921 3631	Branxton Hill South. Rectilinear on plan. The enclosure is defined by two strictly parallel ditches set *c*.5m apart. The interior space measures 105 × 70m and has an area of 0.67ha. There are entrances through both ditches at two points on the SE-facing side close to the SE and SW corners. Within the enclosure there are traces of three or more round houses. Round the outside of the enclosure there are fragmentary signs of a third, narrow ditch perhaps forming an external corral or annexe. Additionally, two linear ditches form antenna-like projections extending outwards beyond the two entrances. These may form part of a system of ditched boundaries to the S.
1127	NT 8775 3634	East Moneylaws North. Sub-rectangular on plan. The enclosure is formed by two (or perhaps three) more or less parallel ditches. There is an entrance on NW facing side. The middle ditch encloses a space measuring *c*.100 × 75m and contains an area of *c*.0.7ha. The spacing between the ditches varies from 15–25m. On the N side the outermost ditch diverges to form a subsidiary enclosure or annexe.
1134	NT 8716 3979	Cramondhill 1. Strictly rectilinear on plan. The enclosure is formed by two, or possibly three, parallel ditches enclosing a space measuring *c*.60 × 45m with an area of *c*.0.26ha. One possible round house is visible in the interior.
NT 84 SE		
1383741	NT 8702 4012	Cramondhill North. Sub-rectangular on plan. The enclosure is formed by two ditches spaced 10–20m apart. On the S and E sides the outer ditch diverges from the inner ditch suggesting that the two may not be contemporary. The inner enclosure has maximum internal dimensions of 70 × 65m and encloses an area of 0.44ha. There is a probable entrance in the E-facing side of the inner ditch and another in the SE angle of the outer ditch.
1385175	NT 8820 4089	Melkington. Rectangular on plan. The enclosure is formed by two parallel ditches set 8–12m apart. The space enclosed by the inner ditch measures 45 × 50m and has an area of 0.2ha. There is a staggered entrance through both ditches on the NE-facing side.
NT 94 NW		
4036	NT 9164 4576	Battle Moor. Sub-square on plan. The enclosure is formed by two parallel ditches spaced 8–13m apart. There is an entrance through both ditches in the centre of the E-facing side. The inner ditch encloses a space measuring 65 × 60m and contains an area of 0.34ha.
4041	NT 9085 4626	East Newbiggin. Rectangular on plan. The enclosure is formed by two strictly parallel ditches spaced 7–10m apart. There are opposed entrances through both inner and outer ditches in the centre of the E and W facing sides. The inner ditch encloses a space measuring 65 × 55m and contains an area of 0.33ha.
4045	NT 9106 4861	Greenhill 1. Pentagonal on plan. The enclosure is formed by two strictly parallel ditches spaced 8–10m apart. There is an entrance through both ditches at the point where the two E-facing sides converge. The interior space has maximum dimensions of 50 × 55m and an area of 0.21ha.
NT 95 SW		
4308	NT 9313 5015	Horncliffe. Presumed rectangular on plan. Three parallel ditches form the SE and SW facing sides of an enclosure situated at the top of a steep slope. There is an entrance centrally placed in the SE facing side. On the W side of the entrance the middle and outer ditch project outwards to form a protective hornwork. This site has also been described as a Roman fortlet though this identification has not received support from Roman military specialists.

19. Rectilinear enclosures with two, closely spaced ditches – cropmarks

NU 01 NW		
1034524	NU 0215 1596	Ingram South. The principal enclosure is defined by double ditches set *c*. 8m apart. There is a clearly marked entrance through both ditches in the centre of the E facing side. Another break, in the inner ditch only, in the SE corner may also be an original feature. The main enclosure has interior dimensions of 50 × 57m and an internal area of 0.27ha. To the E of the main enclosure is a rectilinear annexe with an entrance in the S side. The annexe has interior dimensions of 57 × 67m and an internal area of 0.37ha. There are further fragmentary ditches to the E of the annexe which may represent a further enclosure.

20. Late prehistoric and Romano-British enclosed settlements – earthworks

NU 01 NW		
4937	NU 0102 1813	Reaveley Hill. An oval enclosure is formed by an earth bank. It has interior dimensions of *c*.46 × 58m and contains an area of 0.23ha. Additionally there is a second bank round the NW exterior of the perimeter. At least one round stone house is present in the interior with other possible examples outside to the W. These may represent a secondary phase of occupation.
5011	NU 0016 1628 NU 0016 1623	East Brough Law 2. 'A': A sub-oval enclosure is formed by a boulder wall and contains at least four round stone founded houses. East Brough Law 2. 'B': A further enclosure containing at least one round stone house. Both enclosures have been damaged by afforestation.
1033869	NU 0057 1503	Haystack Hill. A group of irregularly shaped enclosures containing scooped yards and platforms and perhaps as many as 20 round stone houses. The site has been damaged by mediaeval or later rig ploughing.
1033870	NU 0058 1521	North Haystack Hill. A group of irregularly shaped enclosures with scooped interiors. One possible round stone house has been identified. The site has been mutilated by mediaeval or later rig ploughing.
5036	NU 0044 1633	East Brough Law 1. 'A' : An almost circular enclosure is formed by a bank of earth and stone. The enclosure measures *c*.13 × 14m and contains one possible round house foundation.
5090	NU 0049 1701	Reaveley Hill. A sub-oval enclosure, measuring *c*.16 × 9m and containing one round stone house.
1033864	NU 0017 1586	South East Brough Law. 'B': A sub-circular enclosure now damaged by afforestation. There is no surviving evidence of interior occupation.
1033872	NU 0046 1782	Reaveley Hill Cottage. A roughly circular enclosure measuring *c*.26m in diameter and containing the doubtful remains of one round house.
1034445	NU 0019 1581	South East Brough Law. A sub-oval enclosure measuring 32 × 84m and containing an area of 0.1ha. The interior is featureless.
1034448	NU 0018 1594	South East Brough Law. 'A': A scooped enclosure containing two round stone houses. Two further round houses lie outside to the W. The site has been afforested.
1034484	NU 0020 1733	Reaveley Hill. A sub-oval homestead takes the form of an embanked courtyard which measures11 × 13m and contains one visible round stone house.
1034502	NU 0104 1691	Reaveley Hill. An almost square embanked enclosure with an entrance in the centre of the E facing side. The enclosure measures 23m square internally and contains an area of 0.05ha. Three mutilated round stone house foundations are visible in the interior.
1381615	NU 0134 1853	Reaveley Greens W. A circular embanked enclosure with an internal diameter of 30m. There are no definite traces of house foundations in the interior.
1381961	NU 0247 1561	Snail Knowe. An irregularly shaped enclosure which measures 18 × 35m and contains an area of 0.05ha. In the centre of the enclosure is a possible round house.

NU 01 NE		
4885	NU 0687 1655	Crawley Tower. The NW segment of a probable settlement enclosure is preserved as an earthwork. The enclosure is formed by a broad ditch and counterscarp bank. The earthwork may represent a late prehistoric or native Roman settlement though a mediaeval origin has also been proposed.
NU 02 SE		
5784	NU 0771 2139	Old Bewick. An enclosure of indeterminate plan which contains two stone built round houses.
5812	NU 0721 2268	Folly Wood South 1. A sub-rectangular scooped enclosure with interior measurements of 25 × 30m and an internal area of 0.08ha.The enclosure contains one possible round stone house.
5817	NU 0747 2262	Folly Wood South 2. A mutilated enclosure with a scooped interior. The enclosure is sub-rectangular in plan with internal dimensions of 27 × 34m. No round stone houses are visible in the interior.

21. Single-ditched, curvilinear enclosures – cropmarks

NU 01 NW		
1381879	NU 0430 1886	Nova Scotia. A possible D-shaped (?) enclosure is represented by a curvilinear ditch.
1381889	NU 0175 1746 NU 0178 1742	Reaveley North 1. S half of a probable circular (?) ditched enclosure containing two possible round house sites. Maximum internal diameter *c.*55m. Reaveley North 2. E half of sub-circular (?) ditched enclosure with an internal diameter of *c.*35m.
1381892	NU 0175 1520	Fawdon Dean 1. Oval ditched enclosure with maximum interior dimensions of 35 × 50m and an internal area of 0.10ha.
1381909	NU 0289 1505	Fawdon Burn. Oval, single-ditched (or palisaded ?) enclosure with interior dimensions of *c.*50 × 85m and an internal area of 0.34ha. Probable entrance on the N side. Possible annexe on N side ?
NU 01 NE		
1378735	NU 0572 1953	Percy's Cross. An oval enclosure defined by a single broad ditch. The enclosure has interior dimensions of 70 × 100m and an internal area of 0.68ha. Probable entrance at the E apex ? Within the compass of the ditch are two concentric lines of palisade which most probably represent one, or two, palisaded enclosures of earlier date.
1378762	NU 0730 1609	Crawley Dean. A broad curvilinear ditch forms a semi-circular arc backing onto a steep slope above a burn. The enclosure so formed has a diameter of *c.*80m and an estimated internal area of 0.34ha. The site is likely to be defensive in character.
NU 02 SE		
610162	NU 0515 2270	Bewick Bridge West. Two curving arcs of ditch probably represent the N and S sides of an enclosure with estimated interior dimensions of 55 × 75m and an internal area of 0.36ha. There are wide gaps in both E and W facing sides which may correspond to entrances. On the E side two narrow ditches, which may be contemporary, appear to form a funnel shaped approach.
1380561	NU 0705 2368	Segment of curving ditch which may represent the E facing arc of a curvilinear enclosure. A break in the ditch may represent an entrance.
NU 03 SE		
6169	NU 0787 3064	South Lyham. Sub-circular enclosure defined by a broad (7m wide) ditch and vestiges of an outer bank. The SE sector of the bank is completely ploughed out. The enclosure has internal dimensions of 35 × 45m and contains an area of 0.13ha.
6182	NU 0973 3143	Northmoor. Sub-circular enclosure with breaks in the W and NE facing sides. The enclosure has internal dimensions of 20 × 25m and contains an area of 0.04ha.
1382576	NU 0619 3218	North Lyham. Enclosure formed by both straight and curving lengths of ditch. Internally it has maximum dimensions of 60 × 65m and contains an area of 0.41ha. There are breaks in the E, N and W sides any of which could be entrances. On the N and W sides there is a second, outer ditch separated by a distance of *c.*8.0 from the inner one. To the S of the main enclosure there is a rectangular annexe which has dimensions of *c.*40 × 70m and contains an area of 0.44ha. There are breaks in the ditch forming the annexe on the W, S, and E sides any, or all, of which may be entrances. To the NE of this settlement, at a distance of 100–180 m, is a curving ditch, 250m long, which may represent a contemporary boundary.

22. Single-ditched, rectilinear enclosures – cropmarks

NU 01 NW		
5204	NU 0257 1798	Whitridge Knowe. Sub-square on plan with a probable entrance in the SE facing side. Interior dimensions 40 × 45m and internal area 0.18ha. One possible interior round house.
5226	NU 0412 1540	Brandon Buildings. W half only of a rectilinear (?) enclosure. In the SW sector the enclosure appears to be formed by two close set ditches.
1381876	NU 0484 1836	Brandon Hill NE. Trapezoidal enclosure with entrance in the E facing side. Interior measures 30 × 35m containing an area of 0.10ha. A short length of ditch projects from the NE corner and there are two ring ditches within 80m to the SE.
1381892	NU 0175 1525	Fawdon Dean 2. Sub-rectangular on plan with an entrance in the E facing side. The enclosure has interior dimensions of 55 × 60m and an internal area of 0.28ha. The S perimeter overlaps with (and is later than) an oval enclosure. To the N is a possible annexe of uncertain size. At least two possible round house sites are visible in the interior.
1381906	NU 0357 1755	Heddon North. Part of a sub-rectangular enclosure is visible as a cropmark. Its estimated internal dimensions are 30 × 38m and it contains an area of 0.13ha.
NU 01 NE		
1378750	NU 0664 1853	Gallow Law. Rectangular ditched enclosure with estimated interior dimensions of *c.*50 × 60m and an internal area of 0.27ha. Possible entrance in the N facing side. Contains one probable round house site.
NU 02 SE		
1380488	NU 0637 2375	Follyburn Wood N. Sub-rectangular enclosure with entrance in the E facing side. S side prolonged by projecting ditch ? Estimated interior dimensions *c.*40 × 40m.
1380492	NU 0607 2209	Bewick Bridge E. Rectangular enclosure with entrance off centre in the S facing side. Maximum interior dimensions 90 × 105m containing an area of 0.84ha.
NU 03 SE		
6166	NU 0991 3265	Derry Dykes. Rectangular enclosure with entrance in the centre of the E facing side. It has interior dimensions of 65 × 70m and contains an area of 0.47ha.

23. Pit alignments – cropmarks

NU 01 NW		
1381934	NU 0389 1804	Pit alignment, 50m in length.
NU 01 NE		
1378770	NU 0807 1658 to NU 0827 1680	Pit alignment, 300m in length.
NU 02 SE		
5828	NU 0570 2060 to NU 0613 2059 NU 0569 2065 to NU 0571 2069	New Bewick. Pit alignment, 700m in length with 80m long offset from NU 0594 2050 to 0594 2059. Pit alignment, 50m in length. At NU 0613 2059 the alignment terminates at the corner of a ditched enclosure or boundary in such a way as to suggest that the two were in contemporary use at some stage.
1380488	NU 0613 2365 to NU 0612 2349	Pit alignment, 250m in length.
1380530	NU 0502 2146 to NU 0527 2166 NU 0508 2139 to NU 0502 2146 NU 0534 2165 to NU 0540 2163 NU 0534 2141 to NU 0544 2148 NU 0549 2175 to NU 0549 2180 NU 0501 2146 to NU 0502 2152 NU 0498 2144 to NU 0502 2146	Pit alignment, 320m in length (with gap). Pit alignment, 80m in length (with gap). Pit alignment, 60m in length. Pit alignment, 120m in length. Pit alignment, 50m in length. Pit alignment, 50m in length. Pit alignment, 50m in length.
1380542	NU 0609 2005 To NU 0610 2008	Pit alignment, 36m in length

24. *Grubenhaüser* – cropmarks

NU 01NW		
1381872	NU 0473 1620 NU 0474 1622 NU 0476 1622 NU 0480 1615	Branton East Side. Group of 4 (or five ?) possible *Grubenhaüser*, all *c*. 3 × 4m.
NU 01 NE		
1378750	NU 0669 1854 NU 0676 1853	Gallow Law. Possible *Grubenhaus*, 3.5 × 6m. Gallow Law. Possible *Grubenhaus*, 3.5m square.
NU 02 SE		
5828	NU 0513 2064	New Bewick. Excavated *Grubenhaus*, 4 × 5m (1986). In the same vicinity there are at least another dozen possible *Grubenhaüser*, and possibly up to twice this number, as well as numerous pits.
610162	NU 0509 2276	Bewick Bridge West. Possible *Grubenhaus*, 4 × 5m.
1380530	NU 0505 2154	Wooperton East. Two possible *Grubenhaüser*.
1380542	NU 0602 2015	New Bewick South. One possible *Grubenhaus*.

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Index