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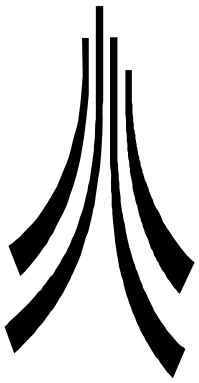

October 1996

KIDBURNGILL

Cumbria

Stratigraphic Survey Report

Commissioned by:

The Cumberland Coal & Fireclay Co Ltd

Kidburngill,
Nr Asby
Cumbria

Stratigraphic Survey Report

Checked by Project Manager. ..... Date
Passed for submission to client. ..... Date

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October 1996

CONTENTS

ACKNOWLEDGMENTS

Thanks are due to the staff of the Cumberland Coal and Fireclay Co Ltd and Dennis Dickens and John Fletcher of Cumbria Environmental and Geological Services.

The stratigraphic coring was undertaken by Elizabeth Huckerby, and Vernon Furnell. The report was compiled by Elizabeth Huckerby and edited by Jamie Quartermaine (Project Manager) and Rachel Newman (Assistant Director). The project was managed by Jamie Quartermaine.

EXECUTIVE SUMMARY

Lancaster University Archaeological Unit was commissioned by the Cumberland Coal and Fireclay Co Ltd to evaluate the peat deposits of a former tarn basin at Kidburngill opencast coal site, Cumbria.

The preliminary gross stratigraphic survey at the former tarn basin involved the sampling of two transects of peat cores, which were orientated east/west and north/south. These transects provided evidence of the deposit type and their level of preservation; the results of the work are presented in the form of gross stratigraphic diagrams, which provide information as to the development of the site.

Initially it appears that the deposits developed on sand, within which, in one core, charcoal was recorded. Fen/carr peats and lake muds were identified, in different areas of the basin, but both were overlain by *Phragmites* peat indicating reed swamp conditions. This in turn was inundated by mineral in-wash, comprising fine silts or clays and which have been colonised by *Equisetum* (horsetails) suggesting very wet, open conditions.

An exposed peat section close to the present opencast mining area was also examined, which appears to be of a different origin from that of the tarn basin. It was approximately 1m deep and had developed on glacial clays; it was overlain by mineral deposits, which is an unusual feature. The peats were predominantly of wood, both birch and alder, and charcoal was recorded at the lower mineral/organic interface. Evidence from other sites suggests that the initiation of peat of this type is triggered by disturbance to the vegetation, resulting in a change in the water table. On the basis of the presence of alder within the stratigraphic record it is possible to suggest that these deposits began to form after 6000 BC.

The palaeobotanical and archaeological potential of the peat deposits is of a quality to justify further recording prior to their destruction. It is therefore recommended that stratified cores be extracted from both the tarn basin and the exposed peat near the opencast working. In each case two cores should be taken, one of which will provide more detailed evidence of the deposits and should be dated by pollen evidence. The other core should be preserved as a valuable palaeoecological archive for future research.

In addition, the peat deposits near the opencast working, which appear to be of greater palaeobotanical potential than those of the basin, should be examined palynologically, with the provision for radio-carbon analysis of the top and bottom of the core to provide a more reliable chronology. An archaeological examination of the lower boundary for artefactual evidence should also be undertaken.

1. INTRODUCTION

1.1 A stratigraphic survey was undertaken by the Lancaster University Archaeological Unit (LUAU), on behalf of Cumbria Environmental and Geological Services (CEGS) and Cumbrerland Coal & Fireclay Co Ltd, in advance of the extension of the proposed Kidburngill Opencast Coal development near Moorside Parks, West Cumbria.

1.2 The existence of a former tarn was identified by Dennis Dickens of CEGS, which was shown as a deposit of alluvium on geological mapping (1926). The County Archaeologist required that this be investigated by a programme of palaeoecological evaluation and a project design was prepared by LUAU in accordance with a verbal brief by the County Archaeologist. This was undertaken in conjunction with a archaeological evaluation undertaken by CEGS, which involved a desk top study and programme of trial trenching (CEGS 1996). The trenching did not identify any archaeological evidence in the vicinity of the former tarn; however, a number of natural depressions were found containing waterlogged wood.

1.3 The purpose of the assessment was to establish the stratigraphy of the peat deposits and the extent and condition of the peat in and around the area of a former tarn, which was undertaken by coring the deposits. It was also required by the County Archaeologist that an exposed peat section, 200m to the north-east of the tarn be examined.

1.4 This report assesses the significance of the data within a local and regional context and advises on any mitigation measures necessary, following this stage of the work, to protect and/or record identified peat deposits.

1.5 This report presents the results of this work as a gazetteer (*Section* 6) and core diagrams in conjunction with a methodology statement and an assessment of the palaeoecological potential of the study area.

2. METHODOLOGY

2.1 Project Design

2.1.1 A project design (Appendix 1) was submitted by LUAU in response to a request by Cumbria Environmental and Geological Services for an assessment of the former tarn to establish the survival and stratigraphy and preservation of the peat in this area prior to the proposed extension of the Kidburngill opencast coal extraction site. The project design was prepared in accordance with a verbal brief from the County Archaeologist.

2.1.2 The project design provided for an initial stratigraphical assessment of the deposits, involving transect coring across the former tarn. Further to the submission of the Project Design, the County Archaeologist requested that an examination be made of an exposed peat section to the north end of the former tarn (fig 2). The results of the stratigraphic analysis of both areas are presented in this report.

2.1.3 The work has been carried out entirely in accordance with the project design.

2.2 Stratigraphic Coring

2.2.1 A 30mm bore *Eijkelkamp* gouge auger was used to obtain cores of peat for rapid field description. Cores from two transects were recorded, one of a north/south orientation and the other east/west. The sampling interval varied from 20-100m depending on their position in the former tarn. Problems were encountered in retaining samples in the auger chamber because of the high water table and unconsolidated nature of the sediments. Analysis of the core samples was undertaken on site.

2.2.2 The cores were levelled into Ordnance Datum with respect to a temporary benchmark provided by Cumberland Coal & Fireclay Co Ltd. The grid references of the cores are shown in the gazetteer (*Section* 6).

2.3 Peat Section Inspection

2.3.1 A brief examination of an exposed peat section to the north of the tarn was undertaken. The section was briefly cleaned and exposed vegetational ecofacts were investigated. The stratigraphic sequence was defined but a section drawing was not produced.

2.4 Presentation of results

2.4.1 The data obtained from the stratigraphic transects are presented as transect diagrams: figures 3 and 4 show the peat types, depth of cores, and position of the cores and figures 5 illustrates the broad shape of the former tarn. The locations of the transects and the exposed peat section are shown in the study area map (fig 2). The symbols used in the diagrams are based on those of Troels-Smith (1955). An

assessment has been given of the interpretation and palaeecological potential of the site.

2.5 **Health and Safety**

2.5.1 Both Lancaster University and LUAU maintain Safety Policies, the latter based on the SCAUM (Standing Conference of Unit Managers) Health and Safety Manual (1991). In keeping with current Health and Safety at Work Regulations, prior to commencing on-site work, a risk assessment for each activity was completed. Due regard was given to all Health and Safety considerations during all aspects of the project.

3. TOPOGRAPHIC AND HISTORICAL CONTEXT

3.1 Location and topography

3.1.1 Kidburngill Tarn is located 7½km east of the Cumbrian Coast (near Parton and Moresby) and is only 3½km to the west of the Lake District Fells, west of Loweswater and Crummock Water, which rise to a height of between 400-550m. The natural terrain is predominantly undulating, but generally low-lying marginal land and significant proportions of it are unimproved.

3.1.1 The tarn is situated in a hollow below a ridge of low hills (which rise to a height of 247m) and follow in a south-west/north-easterly orientation, on the side of the valley of a tributary, which joins the river Marron, at Ullock. The former tarn is oriented north/south and is *c*250m x 50m in size.

3.2 Historical Background

3.2.1 Around 10,000BP the ice-sheets which had covered the Lake District started to retreat, and, immediately after the departure of the ice, boulder clay was laid down (Simmons *et al* 1981, Fig. 3.1). In its wake the tundra vegetation: lichens, grasses, and dwarf shrubs, gradually colonised the landscape. By 6000BC most of the landscape (below 500m) was covered by trees, mainly birch, pine, hazel, elm, and oak, although the valley bottoms were colonised by varieties such as willow and subsequently alder. Elk, wolves and deer are thought to have roamed around this primeval forest (Trescatheric 1993).

3.2.2 There is no conclusive evidence for Palaeolithic occupation within this area of the Cumbrian coastal plain, and current evidence suggests that man first occupied the region during the Mesolithic period, between 5000bc and 3500bc. Several artefact scatters have been discovered along the West Cumbrian coast, notably at Drigg and Eskmeals, which contained Mesolithic microliths fashioned out of beach flint (LUAU 1996). These sites probably do not represent permanent occupation, but seasonal camps, which were concentrated on the coastal plain where food was more plentiful.

3.2.3 The Neolithic period dates to between 3500bc and 2000bc, and has left a number of finds in the area including stone axes, hammers, adzes, and pottery sherds. Quern stones, and the bones of sheep and ox were associated with these remains, indicating a shift from a hunter gatherer existence to a more settled farming lifestyle (Barnes 1951). Forest clearance took place during this period, and there is some evidence to suggest that emmer wheat and barley may have been cultivated towards the end of the Neolithic (Trescatheric 1993).

3.2.4 There is considerable evidence of Bronze Age activity from around the area, particularly to the south-east of the study area (Town Bank and Stockdale Moor) (Quartermaine 1989, Richardson 1982). The surface features from this period typically comprise burial cairns, cairnfields (agricultural clearances), and occasional settlements. They are most commonly located in areas of marginal upland between 100m and 300m AOD, and are often adjacent to the coastal plain.

3.2.5 During the Roman period part of the Hadrian's Wall *limes* system extended down the Cumbrian coastal plain from the western end of the Wall; it comprised a series of Roman forts, notably those at Maryport, Moresby and Ravenglass. The forts were linked by roads, one of which runs only 2km away from the development site.

3.2.6 Early medieval activity in the region is represented in the form of monumental sculpture; Anglian and Scandinavian crosses have been identified from the area of the coastal plain, notably at Irton and Beckermet, and Waberthwaite. This is confirmed by place-name evidence notably thwaite names (eg Branthwaite) which indicates a Scandinavian colonisation of the area in the tenth and eleventh centuries. In addition, place-name evidence suggests that there may have been a resurgence of the Kingdom of Strathclyde in northern Cumbria and the coastal plain, again in the tenth to eleventh centuries. There is extensive evidence of medieval settlement within the region and also the survival of some medieval landscapes, particularly within the Ennerdale valley (LUAU 1995).

3.2.7 Prior to 1820 the study area was a part of Willimor Common, but was then enclosed and remained in agricultural use until at least the 1860's. By 1874 mining activity had been initiated and continued until 1951.

3.2.8 There are extensive physical remains of coal mining activity in the area and also within the area of the opencast workings (CEGS 1996). The former mine was characterised by large spoil heaps and the survival of a single brick hut, which is shown on the 1925 OS 1:2,500 mapping, but not on the 2nd edition OS map (1899).

3.2.8 The area of proposed opencast coal extraction at Kidburngill is in an area of known prehistoric settlement and its partly unimproved landscape will have allowed the survival of early archaeological monuments and landscapes.

4. ASSESSMENT OF PALAEOECOLOGICAL POTENTIAL

4.1 Site Inspection

4.1.1 The water table was high at the surface of the vegetation which made coring and levelling difficult. The vegetation was predominantly horsetails (*Equisetum* spp) although some semi-aquatic plants and wet fen species were noted. This suggests a slightly base-rich environment rather than an ombrotrophic (ie rainfed) acid mire.

4.2 Basin Development (figs 3 and 4)

4.2.1 The base mineral soils at the bottom of all the cores were sand and clays. Organic muds formed above these mineral soils and were recorded within the majority of the cores (except cores 4NS and 3EW) suggesting aquatic conditions. At the north of the basin the wood peats at the base of core 4NS indicate a wet woodland of birch or alder in this area. The aquatic conditions were replaced by a more terrestrial community of a reed swamp, as evidenced by the records of *Phragmites* peat with some alder wood recorded. In the deepest core (core 2EW), however, the presence of organic muds above the Phragmites peat suggest that the water table rose and aquatic conditions were re-established in this part of the tarn. The reed swamp was replaced by deposits of silty clay with the development of a community of horsetails as found today. This silty clay may have been caused as the result of inwash, possibly caused by increased runoff from the hillsides, which may have resulted from woodland being cleared at some time in the past causing soil instability. Charcoal was recorded at the sand/mud interface in two cores (core 3NS and core 3EW).

4.2.2 ***Basin Shape*** (see fig 5): The greatest depth of sediment recorded was 3.30m and the least of 0.775m. The basin is elongated in a north/south direction in excess of 250m but is only *c*50m wide east/west. The underlying mineral deposits are undulating and shelve gently from the north but slope abruptly from east to west.

4.2.3 ***Age of Deposits:*** The records of organic muds suggest that a tarn existed at the site at some period in recent geological time. It is impossible from only a brief field survey to determine when this occurred. However, when wood was recorded in the sediments it was identified as alder, which is generally thought to have migrated into the British Isles at *c* 6000BC (Godwin 1975). This would tentatively suggest that organic deposition was initiated at about this time or more recently. It must be stressed, however, that pollen analysis and/or radio-carbon dates may contradict this.

4.3 Exposed Peat Section

4.3.1 An exposed peat section close to the present opencast mining area was examined. This peat deposit appears to be of a different origin from that of the tarn basin. It was approximately 1m deep and had developed on glacial clays; it was overlain by mineral deposits, which is an unusual feature. The peats were predominantly of wood, both birch and alder, and charcoal was recorded at the lower mineral/organic

interface. On the basis of the presence of Alder within the stratigraphic record it is again possible to suggest that these deposits are later than 6000BC.

4.3.2 Evidence from other sites suggests that the initiation of peat of this type is triggered by disturbance to the vegetation, resulting in a change in the water table. The presence of charcoal at the mineral / organic interface is potentially significant as it would indicate that the formation of the peat was associated with an episode of forest burning. Although this potentially could be attributable to natural causes, it perhaps more probably reflects human intervention, associated with the localised clearance of woodlands, which would have precipitated the formation of peat.

5. DISCUSSION

5.1 The stratigraphic survey has been able to provide a cursory examination of a former tarn and adjacent peat deposits which have the potential to inform the ecological and archaeological development of the landscape. It is therefore possible to suggest, on the basis of these results, the hydrographic development of the tarn basin; however, this can only be of limited accuracy because of the very basic analysis undertaken at this stage.

5.2 The basin was formerly a tarn, at a time when the area was predominantly woodland. The presence of alder would suggest that the deposits post-dated 6000BC, which was when this tree taxa is thought to have migrated into Britain. The tarn was only in existence for a short time, before becoming a reed swamp, this in turn was overlain by silty caly deposits which may be attributable to an increased soil runoff from the surrounding hill-side. The typical cause of such soil movement is the loss of trees, which would otherwise have stabilised the integrity of the topsoil.

5.3 Both within the exposed section and within the basin, charcoal was identified at the interface between the organic and mineral soils. The charcoal in this context is typically attributable to forest burning. This could have been a result of natural fires which would have had a temporary impact upon the woodland, but is likely to have been followed by forest regeneration. Alternatively, it could reflect deliberate forest clearance for agriculture, in which case the agricultural activity in the region would have discouraged forest regeneration. It is not possible, however, to establish the extent to which the forest recovered without further analysis. The initiation of peat development, may reflect significant quantities of charcoal in the soil, which would have limited the porous nature of the ground and encouraged waterlogged soil conditions. The presence of charcoal at the mineral / organic interface, coupled with the increased run-off from the hills, would suggest that the area was subject to forest clearance and it is possible to suggest that this was intended for agricultural working.

6. PALAEOECOLOGICAL IMPACT AND RECOMMENDATIONS

6.1 Impact

6.1.1 This stratigraphic survey has highlighted a palaeoecological resource of local and regional significance. It would provide a record of vegetational development during some periods of prehistory; it may therefore provide a valuable indication of land use in the area during this period.

6.1.2 The development proposals involve the destruction of the peat and the palaeoecological resource. There is consequently a need for a further programme of work to mitigate the palaeoecological destruction.

6.2 Recommendations

6.2.1 LUAU conducts evaluations in accordance with the Institute of Field Archaeologists' Code of Conduct and best practices, and also in the light of *The management of archaeological projects* (English Heritage 2nd edition 1991). Our concern must be to protect and preserve archaeological sites wherever possible, and only where this is not feasible are destructive techniques advocated. Our aim is to recommend the appropriate action which will achieve recording objectively, without any waste of resources.

6.2.2 The preferred option is that a small proportion of the peat deposits around the exposed section and within the area of the former tarn is left undisturbed; this can be as little as 5% of the affected peat deposits. However, the long term drainage of the preserved peat deposits must not be affected by the proposed opencast extraction as any drying out of the peat would effectively destroy the palaeoecological potential of the deposits.

6.2.3 If it is not possible to preserve part of the deposits it is recommended that a further programme of detailed palaeoecologcal recording is undertaken to mitigate the destruction of the resource by the development. A pair of cores should be taken, with a Russian-type corer, from the area of the former tarn, and a further pair of peat cores should be taken from the exposed section which 200m to the north-east of the former tarn. One of each pair of cores should be held in cold storage as a palaeoecolgical archive.

6.2.4 A brief assessment of the pollen record should be undertaken to obtain some indication as to when organic deposition was initiated and when the mineral inwash took place. Radiocarbon dates should be obtained from the top and bottom of the exposed peat, in the section to the north-east of the tarn, to provide a reliable indication of the palaeobotanical chronology.

7. GAZETTEER

Core **1EW**
NGR: NY 05365, 21049
Height: 131.07m OD

Depth below surface	***Deposit***
0-0.04m	unsampled
0.04-0.595m	Fibrous wood peat with *Phragmites* rhizomes H4
0.595-0.775m	Silt

Core **2EW**
NGR: NY 05390, 21053
Height: 131.77m OD
Position: 25m east of core 1EW

Depth below surface	***Deposit***
0-0.50m	unsampled
0.50-1.00m	Silty clay + Horsetails
1.00-1.40m	*Phragmites* peat H3-4
1.40-1.50m	Unsampled
1.50-1.82m	*Phragmites* peat H3-4
1.82-2.00m	Organic clay
2.00-2.17m	Fibrous peat H3-4, wood at 2.17m
2.17-2.50m	Organic clay
2.50-2.94m	Organic clay + wood
2.94-3.09m	Organic clay
30.9-3.39m	Organic sand with charcoal at 3.19m

Core **3EW**
NGR: NY 05410, 21056
Height: 131.80m OD
Position: 45m east from core 1EW

Depth below surface	***Deposit***
0.00-0.65m	Unsampled
0.65- 0.80m	*Phragmites* peat H3
0.80-1.00m	Unsampled
1.00-1.47m	*Phragmites* peat
1.47-1.60m	Clay and stones

Core **1NS**
NGR: NY 05383, 21102
Height: 132.07m OD
Position: 50m north from Core 2EW

Depth below surface	***Deposit***
0.00-0.20m	Unsampled
0.20-0.75m	Clay and Horsetails
0.75-1.00m	Unsampled
1.00-2.00m	*Phragmites* peat H2-3 Alder wood at 1.05m Clay at 1.85m
2.00-2.46m	Organic mud
2.46-2.59m	Sandy silt

Core **2NS**
NGR: NY 05375, 21152
Height: 132.37m OD
Position: 100m north from Core 2EW

Depth below surface	***Deposit***
0.00-0.26m	Unsampled
0.26-0.60m	Silty clay with *Phragmites*
0.60-1.76m	*Phragmites* Peat H3 Alder wood at 0.78-0.80m
1.76-2.25m	Organic mud with some sand, wood at 2.25m
2.25-2.50m	Organic sand +some wood

Core **3NS**
NGR: NY 05372, 21172
Height: 132.39m OD
Position: 120m north from Core 2EW

Depth below surface	***Deposit***
0.00-0.20m	Unsampled
0.20-0.40m	Silty clay + *Phragmites*
0.40-2.25m	*Phragmites* peat H3, wood at 1.00m, Bogbean seeds at 1.15m
2.25-2.90m	Organic mud with wood
2.90-3.00m	Organic sand + charcoal at 2.90m

Core **4NS**
NGR: NY 05369, 21200
Height: 132.05m OD

Position: 150m north from Core 2EW

Depth below surface	***Deposit***
0.05-0.30m	Clay silt
0.30-0.50m	Fibrous peat + silt
0.50-0.60m	Clay/silt
0.60-1.18m	Fibrous peat + wood
1.18-1.40m	Clay
1.40-1.90m	*Phragmites* + wood peat
1.90-2.32m	Wood peat dry and compacted

Core **5NS**
NGR: NY 05405, 20954
Height: 131.9m OD
Position: 100m south from Core 2EW

Depth below surface	***Deposit***
0.00-0.20m	Unsampled
0.20-0.40m	Clay + Horsetails
0.40-1.59m	*Phragmites* peat H3
1.59-1.74m	Organic mud
1.74-1.82m	Wood peat + *Phragmites*
1.82-2.24m	Clay with some organic remains

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APPENDIX 1
PROJECT DESIGN

Lancaster University Archaeological Unit

October 1995

KIDBURNGILL OPENCAST COAL SITE

CUMBRIA

ARCHAEOLOGICAL EVALUATION

Proposals

The following project design is offered in response to a request from Cumbria Environmental and Geological Services, for an evaluation of peat deposits at the former tarn at Kidburngill.

ILLUSTRATIONS

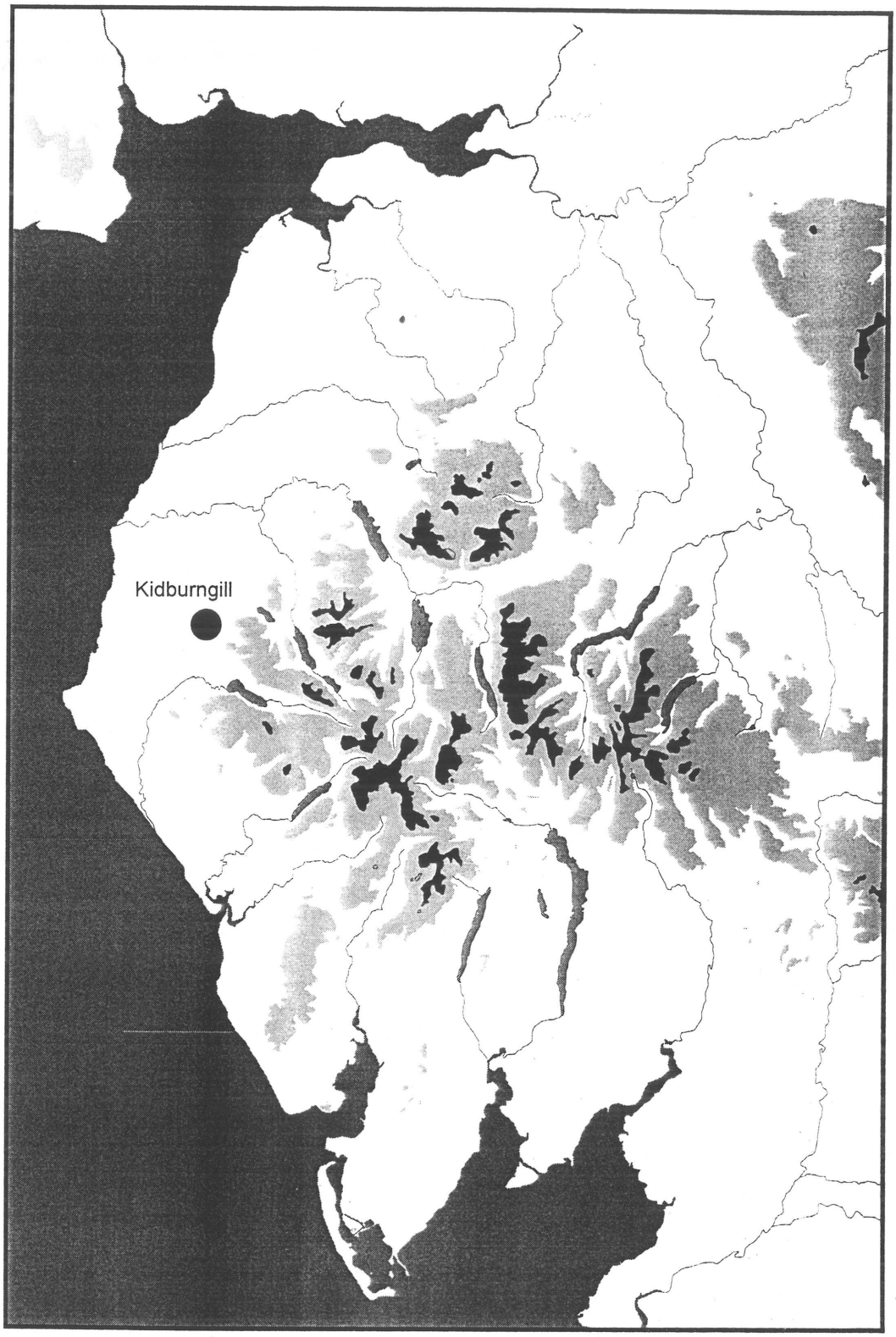


Fig 1 The location of Kidburngill open-cast site

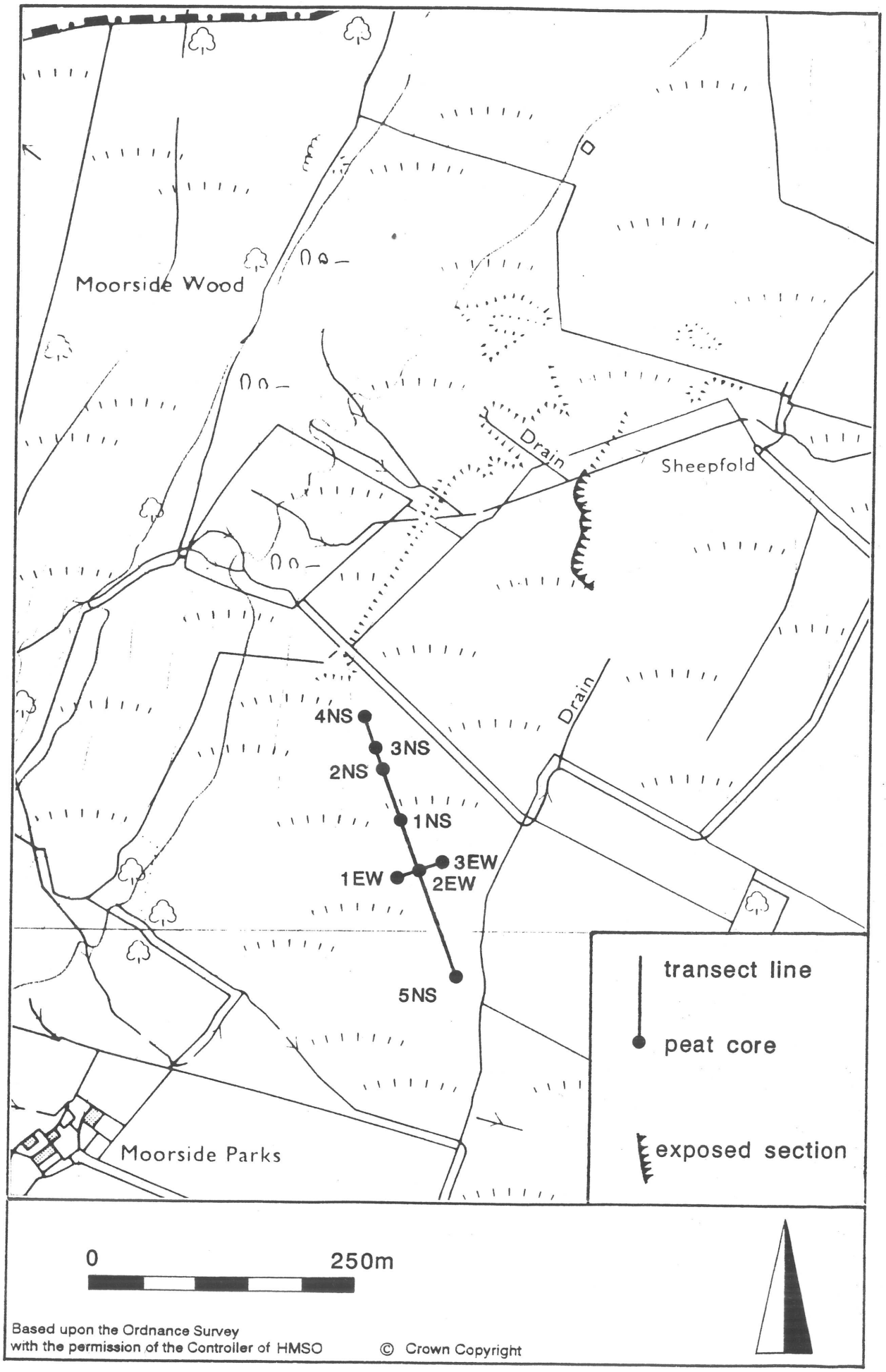


Fig.2 Kidburngill Study Area.
Transects and exposed peat section.

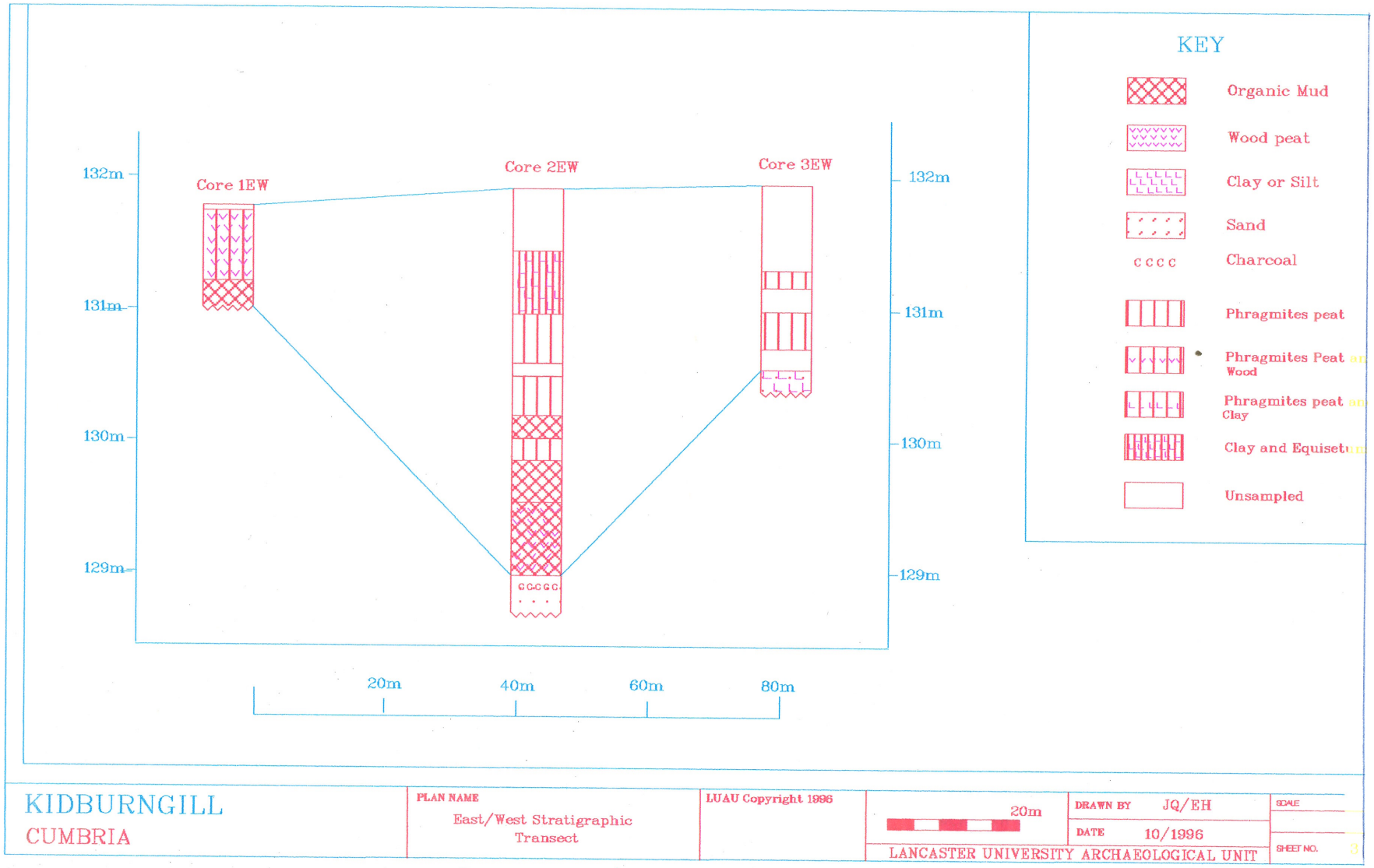
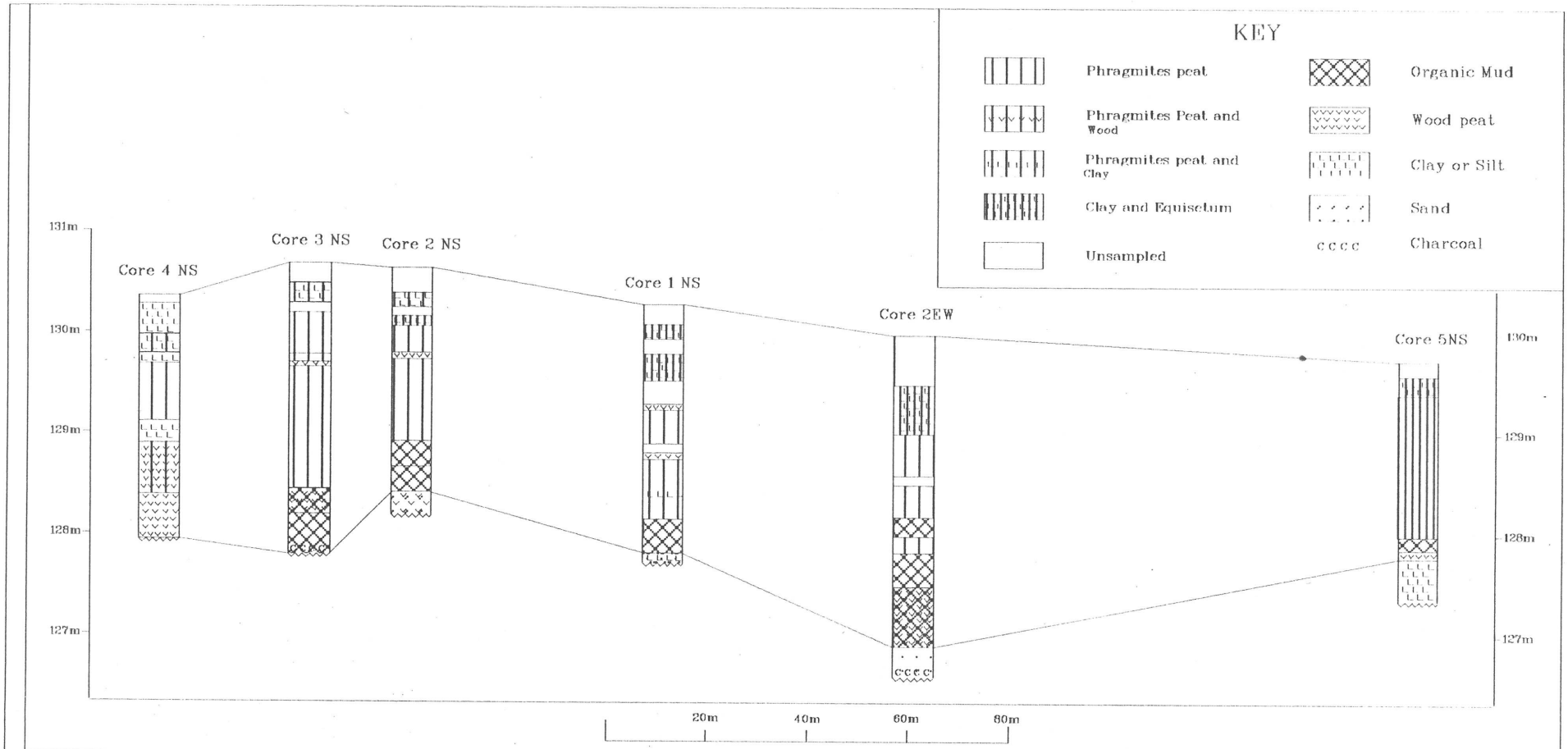
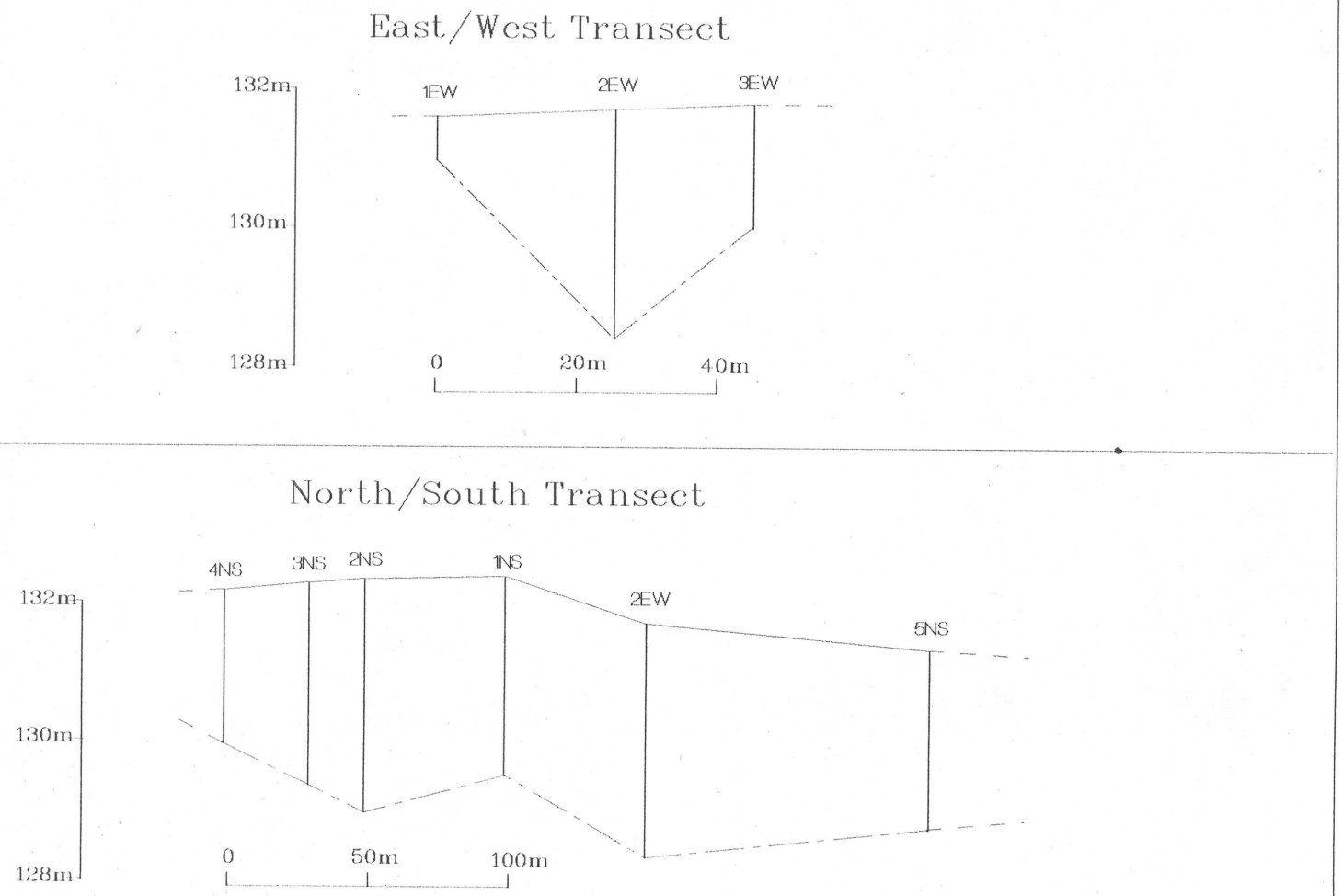


Fig 3 East/West Transect Diagram



KIDBURNGILL CUMBRIA	PLAN NAME North/South Stratigraphic Transect	LUAU Copyright 1996	20m	DRAWN BY JQ/EH DATE 10/1996 LANCASTER UNIVERSITY ARCHAEOLOGICAL UNIT	SCALE SHEET NO. 4

Fig 4 North/South Transect Diagram



KIDBURNGILL (CUMBRIA	PLAN NAME: Basin shape in North/South and East/West Axes	LUAU Copyright 1996	20m	DRAWN BY: JQ/EH DATE: 10/1996 LANCASTER UNIVERSITY ARCHAEOLOGICAL UNIT	SCALE SHEET NO. 5

Fig 5 Diagram showing basin shape in East/West and North/South Axes