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Geological Survey of England and Wales

Geological notes and local details for 1:10000 sheets.

Sheet SE 22 NE
Morley

Part of 1:50000 sheets 77 (Huddersfield) and 78 (Wakefield)

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INTRODUCTION

This account outlines the geology of 1:10 000 Sheet SE 22 NE. The sheet is available as an uncoloured dye-line map on which the map details are supplemented by marginal notes, including a generalized vertical section and skeleton information on the more important shaft and borehole sections. Four environmental maps accompany the geological sheet. They illustrate:

(i) Distribution of Made Ground; (ii) Distribution of drift deposits; (iii) Constructional materials resources; and (iv) Underground mining.

The area, which forms part of Institute of Geological Sciences (England and Wales) 1:50 000 sheets 77 (Huddersfield) and 78 (Wakefield), was first geologically surveyed on the six-inch scale by A H Green, R Russell, J C Ward, T V Holmes and J Lucas, the maps being printed between 1873 and 1876 as Six-inch Yorkshire County Sheets 217, 218, 232 and 233. Subsequently the area was resurveyed between 1924 and 1930 by W Edwards, the results being published over the same period as Six-inch Yorkshire County Quarter Sheets 217 SE; 218 SW; 232 NE, SE; 233 NW, SW. A full description of the area, with details of old workings and many sections that are now obscured, is included in The Geology of the Yorkshire Coalfield (Green and others 1878) and further information is provided by the memoirs accompanying One-inch sheets (now reprinted at 1:50 000 scale) 77 (Wray and others, 1930) and 78 (Edwards and others, 1940).

Over the succeeding half-century, a large amount of new information has become available, mainly from boreholes for foundations, roads and prospective opencast sites. The present 1:10 000 map incorporates these data, and results from a complete resurvey in 1982-83 by I C Burgess, A J Wadge and C G Godwin. Details of shaft and borehole sections are held in the files of the Institute of Geological Sciences, at Ring Road Halton, Leeds LS15 8TQ: early in 1984 these will be transferred to the Institute's headquarters at Nicker Hill, Keyworth, Nottingham NG12 5GG. Most of the mining records, including large scale mine plans, are held by the National Coal Board.

GEOGRAPHY, POPULATION AND LAND USE

The area has a largely urban aspect forming part of the Metropolitan County of West Yorkshire. It lies on the southern edge of the Leeds conurbation, and more than half of the ground is given over to housing, light industrial development and recreation. Morley, in the west, is the main centre together with Churwell, Beeston, Middleton, Woodkirk and Westerton, with ribbon development linking these centres.

Lying on the western margin of the Yorkshire Coalfield, the area is extenively undermined, though extraction has now ceased. The history of working extends back at least to the late eighteenth century, large tips (many now landscaped) forming conspicuous features.

Quarrying of the Thornhill Rock, formerly widespread, is now confined to the Howley Parkarea. Many of the old quarries and natural hollows have in the past been, and are currently being, utilized for tipping of building and general household waste.

The main watershed falls ESE from Bruntcliffe (180 m) to Westerton (120 m), the southward drainage being to the River Calder, the northward to the River Aire via several small streams in the north-west and the larger through valley of Mill Beck in the east, the latter traversed by the main Leeds to Wakefield railway line and falling to below 50 m at its northern end, the lowest ground in the area.

SOLID GEOLOGY

1. General

The area is composed of almost flat-lying or gently undulating rocks of Upper Carboniferous (Westphalian) age. Steeply dipping strata are found only in proximity to major faults. Drift deposits are thin, but much of the area is mantled by weathered and soliflucted clay (Head) which partly obscures the solid rocks. Urban development and tips both serve further to conceal the underlying strata, so that extensive exposures are largely confined to quarries and other artificial sections. For these reasons the details of the solid geological sequences are provided mainly by shafts, boreholes and underground mining. The amount of detail and quality of information provided by these records vary widely.

Borehole and shaft sections form part of the Institute of Geological Sciences archives (see p. 1), and are indexed on six-inch National Grid Maps of the Ordnance Survey. Most of the mine plans are held by the National Coal Board. For an overall view of workings in a given seam, the Board holds six-inch reductions based on National Grid sheets, and details of the workings are available from abandoned mine plans mostly on a 2 chain to 1-inch scale. These reductions may be examined at the NCB North Yorkshire Area HQ, Allerton Bywater, Castleford, West Yorkshire, and the abandonment plans at NCB Mines Records and Mine Drainage Office, Rawmarsh, Rotherham, South Yorkshire, both by appointment only.

A generalized vertical section illustrating the sequence of solid rocks proved in the area is given on the margin of the 1:10 000 geological map; details of shaft and borehole sections in the vicinity appear in Text-figures 1-3.

The strata present range in age through the upper part of Westphalian A (Lower Coal Measures) into the lower part of Westphalian B (Middle Coal Measures). The Clay Cross (Vanderbeckei) Marine Band, marking the base of Westphalian B, has not been identified in this area, but it is known to overlie the Joan Coal. As elsewhere, the Westphalian strata consist of rhythmic alternations of sandstone, siltstone, mudstone and coal. Although coal comprises a very small proportion of the total thickness, it has contributed most substantially to the economy; 14 seams have been worked and, with the

exception of small areas near the Morley-Campsall Fault Belt, the whole area has been undermined. Ironstone and fireclay have also been mined on a small scale, usually in conjunction with the associated coal.

In general, the overall thickness of the strata shows little change across the area, though individual beds show local fluctuations in thickness as do the intervals between the named coals. Details of coal sections are given in Green and others 1878, Wray and others 1930, Edwards and others 1940. These records are not repeated here. Intervening strata are poorly documented and, except for the Thornhill Rock, are not discussed in any detail in this report.

2. Details

The Better Bed Coal (0.2 m) does not crop and has been proved only in the workings of Beeston Manor Nos. 4 and 13 Pits, at West Ardsley, and in the north-east corner of the area where the underlying fireclay has also been extracted from Middleton Broom Pit.

The Black Bed Coal (up to 0.5 m), together with the overlying ironstones were worked extensively north of the Morley-Campsall Fault Belt. The coal was also worked from Bruntcliffe Victoria Pit, north-west of the Bruntcliffe Fault, and from Batley West End Pit to the south-west of that fault. It is assumed to crop out at the margin of the area north of Gildersome, where the sandstone above it forms a marked feature.

The Crow Coal (up to 0.47 m) was worked extensively in south Leeds, and workings are present in the north-east of the area around Beeston and Middleton Park.

The Beeston group of coals was of great economic importance in the Leeds area, being up to 2.6 m thick, though including a number of thin dirt partings. Three persistent coal leaves are present, close together around Beeston. The coal splits southwards from Beeston into Top Beeston (the top and middle leaves) and Low Beeston (the bottom leaf), and westwards into Churwell Thin (the top leaf) and Churwell Thick (the middle and bottom leaves) (Edwards and others 1940 pp. 29-34). For many of the old workings no plans exist, but it

can be assumed that the coals are worked-out over virtually the entire area north of the Morley-Campsall Fault Belt. South of this, shale bands are present within the coal section and workings, though widespread, are less continuous. The Beeston Coal crops out near Mill Shaw where it has been worked opencast. Pillar and stall workings may be present here at shallow depth. The Churwell coals crop out north of Gildersome. There is no records of deep mining, but shallow crop workings may be present.

The Blocking coal (generally less than 0.4 m but locally up to 1.1 m) has been worked at Bruntcliffe Victoria. Shallow workings were found in a small outlier cut by the M621 Motorway east of Churwell, and there are indications that it may have been taken out south of Churwell Grange.

The Middleton Eleven-Yards Coal (up to 0.75 m) was worked over a small area from West Ardsley Pit; also in the south-east from Lofthouse and in the south-west from Howley Park.

The Middleton Main Coal (up to 1.8 m including dirt bands) was a very valuable seam and reserves are probably everywhere exhausted. It comes to crop in the north-east, the outcrop extending through Beeston Park Side across Mill Beck almost to Morley Railway Station. The old workings were probably by pillar and stall methods, which can cause severe foundation problems, especially at shallow depth. The coal was also worked at crop at Gilea House, west of Cricket Hill near Gildersome, and over a small area between faults at Lane Side Hill.

The Middleton Little Coal (up to 1 m), also a valuable coal, can be assumed to be worked-out near surface, even though no mine plans are available and has been practically exhausted at depth. Its outcrop parallels that of the Middleton Main. Ironstones at about this level are reputed to have been worked in Park Wood, Middleton.

The Brown Metals is a composite name for three coals, separated by sandstones and siltstones. The coals are of variable thickness and quality and have been only locally extracted. The First Brown Metal

(up to 1 m) was worked both at crop and at depth along the western margin of the area. It is possible that shallow crop workings are present around Beeston Park Side and in Middleton Park.

The Adwalton Black Coal (up to 1 m) was worked from East and West Ardsley pits, and locally elsewhere at depth. It is possible that crop working took place in the Middleton area. Where present at shallow depth between the Bruntcliffe and Morley-Campsall faults, borehole evidence suggests that it may have been worked extensively though few records exist.

The Emley Moor Rock, a fine-grained sandstone, is locally present between the Adwalton Black and Stone coals.

The Adwalton Stone Coal (up to 1 m) was worked at depth from West Ardsley, Morley Main, Bruntcliffe Victoria and Howley Park pits, mainly because of the 0.15 m bed of "stone" or cannel coal at the top of the seam. Between the Bruntcliffe and Morley-Campsall faults, borehole evidence suggests extensive near-surface extraction. In the Middleton area, crop workings may be present, and the coal was worked opencast at Nabs End (294 278). Between the faults north-west of Daisy Hill (271 284) there is evidence of shallow workings, probably in this coal.

The Joan Coal is generally thin (0.2 m) and there is no record of extraction.

The Clay Cross (Vanderbeckei) Marine Band has not been identified. Its presumed position above the Joan Coal is commonly recorded as "black shale" or "scale" succeeded by mudstones with ironstone nodules.

The base and top of the Thornhill Rock (up to 55 m) (Fig. 3) are ill-defined. The onset of coarser clastic deposition appears to occur at varying levels above the Joan Coal; this may be because of uncertainties in the logging of uncored boreholes but is partly due to the nature of the sandstones, which appear to wedge out rapidly laterally; they are fine-grained, thinly bedded and ripple-cross-

bedded. Thus the line taken as the base of the Thornhill Rock across the area is diachronous. Coarser, more massive sandstones, usually recorded as "strong blue stone", appear between 5 and 20 m above the Joan Coal; they are up to 30 m thick, forming strong features that mark the edges of the outcrops. Formerly widely quarried for building stone and for ornamental purposes, these beds are now largely obscured by tipping. At present the best exposures are in the Britannia Quarries, Morley, where up to 20 m of strata, massive below and cross-bedded above, can be seen. These sandstones, laid down by currents flowing in a north-west to north-north-west direction (J I Chisholm, pers. comm.), are interpreted as braided stream deposits.

The topmost 15 m of the sandstones around Howley Park pass laterally southwards, apparently by interdigitation, into a sequence of thinly bedded sandstones with intervening siltstone bands which present a shaly appearance. The approximate extent of these latter beds is shown on the geological map. They are well exposed in the quarries at Howley Park Brickworks.

The top of the Thornhill Rock is taken at a thin coal, at present exposed in Howley Park Quarry, capping this shaly facies. The coal is locally underlain by up to 5 m of carbonaceous seat-clay, apparently filling channels in the top of the Thornhill Rock. It is overlain by a persistent black shale with shelly ironstone nodules.

Succeeding strata include several thin coals, one or more of which probably correlates with the Lidgett Coal of Wakefield.

The Haigh Moor Coal (up to 1.5 m) is present in the south-east, between the Lee Fair and Topcliffe faults. Few minesplans exist, but archival information suggests that the coal is worked-out over this entire area; it is possible that there may be a number of unrecorded shafts. Between the Thorpe Wood Fault, the Topcliffe Fault and Topcliffe Beck, the coal is worked-out at shallow depth; south of Topcliffe Beck, a small area of unworked coal may remain.

The Haigh Moor Rock crops out over a wide area in the south-east around Westerton, forming a strong feature above the outcrop of the Haigh Moor Coal. It is exposed in Haigh Moor Wood, where it is fine-grained and cross-bedded. Boreholes indicate that over at least part of the area the rock rests directly on the coal, forming a strong roof to the old workings. North of the Topcliffe Fault, borehole evidence suggests that the sandstone is thinner and is even absent locally, as in the sections formerly exposed in the Ardsley railway cutting (Green and others pp. 712 - 714).

The mainly shaly beds above the Haigh Moor Rock include several thin coals, proved in boreholes and shaft sections and formerly seen in the Ardsley railway cutting. The lowest of these is overlain by an oolitic ironstone band, and correlates with a similar coal and ironstone formerly exposed in old quarries at Robin Hood (320 266) (Scott 1978, pp. 465-467). This bed is tentatively correlated with the Shallow Wood Coal of Wakefield.

STRUCTURE

A major NW-SE fault complex, known as the Morley-Campsall Fault-belt, divides the Morley area into two parts; there is little concordance between the structures on either side of it. This suggests that tear faulting has possibly occurred, though no lateral displacement has been proved.

North-east of the Morley-Campsall Fault-belt there is an overall south-eastward dip, but locally the dip is to the north-east or even north-west. A number of small faults are recorded on the mine plans. The major faults are the NE-trending Osmondthorpe Fault, with SE downthrow of 32 m in the Beeston area and 40 m south of Churwell, where it branches into two. A parallel structure - the Middleton-Halton Fault-trough - is a graben, with boundary throws locally in excess of 85 m; the rocks to the south of the graben are thrown down in relation to those to the north of the structure.

South-west of the fault-belt the overall pattern is generally similar. Dips are low and locally undulating; faults commonly vary in throw along their length. There are two major NE-trending faults with SE throws, the Lee Fair Fault (50 m, dying out to NE) and the Bruntcliffe Fault (73 m). The subsidiary structures tend to run parallel to these or to the Morley-Campsall Fault-belt, except in the Westerton area where the general trend is ENE. North-east of the Bruntcliffe Fault, the strata are broken by a number of faults and rise rapidly to the north-west (with dips up to 20^{o}) towards the axis of the Gildersome Half-dome (Wray and others 1930 p. 126).

The Morley-Campsall Fault-belt is complex in detail. Along most of its length it has an overall southward downthrow, reversing in the NW due to the effect of the Gildersome Half-dome. North-west of the Bruntcliffe Fault it forms a complex graben, including a small area of Middleton Main Coal to the NW of Cricket Hill. Between the Bruntcliffe Fault and Daisy Hill, the boundary faults both throw to the south, but to the south-west the throw of the southern fault (Topcliffe Fault) is first cancelled out then

reversed in direction by a small transverse SE-facing monocline at Daisy Hill, creating a much-faulted graben in which strata as high as the Swallow Wood Coal are preserved. A tight half-dome at Dunningley Hill again locally reverses the throw of the Topcliffe Fault, though the main graben continues to the limit of the area.

The northern fault (Thorpe Wood Fault) throws to the south throughout its length. Its dip is variable. Around Barton Grove, where the graben is at its widest, the fault plane apparently dips south-west at less than 45^{o}. Locally the throw exceeds 200 m.

DRIFT DEPOSITS

The drift deposits comprise Till, Alluvium and Head; the first two are restricted to small areas.

Till

Stiff yellow-grey clay, with rounded stones up to 0.5 m diameter, is present over a small area in the extreme north-west of the area in the valley of Farnley Wood Beck, forming part of a larger spread on neighbouring areas to the west. Farther downstream, till-derived boulders incorporated in the Head indicate that the deposit was formerly of larger extent.

Alluvium

Thin alluvial deposits form narrow strips along several of the larger streams. It is possible that there are lenses of peaty material and soft clay lenses within these sands and silts.

Head and Downwash

As elsewhere in Leeds, a yellow sandy clay, generally thin but locally exceeding three metres in thickness, covers much of the ground, extending over all rockstypes in the sub-stratum. Its tendency to thicken in hollows and against obstructions on slopes such as walls and hedges indicate its lack of cohesiveness and instability. It appears to have originated as a weathering layer, possibly partly under periglacial conditions, but present-day weathering and plant growth both contribute to its continuing formation. Rootlets in it commonly extend to two metres below surface.

Because of the thinness of the deposit and its lack of distinguishing characteristics it has not been possible to indicate its distribution on the map; it should be assumed to be present everywhere unless proved otherwise.

MADE GROUND

Made ground, constructed from a variety of sources, covers a considerable part of the area. Many of the older deposits have been built over, and probably not all have been located. In particular some of the older mine tips, many of which have been almost obliterated by subsequent development, have probably escaped detection. So may have some old refuse tips, as records of tipping prior to the establishment of the West Yorkshire Metropolitan District in 1973 are currently inaccessible.

Three categories of made ground are distinguished on the geological map: Landscaped ground; back-filled quarries and opencast-coal pits; and miscellaneous made ground. On the accompanying environmental map, back-filled quarries are distinguished from opencast-coal workings, while colliery waste tips and general waste tips are also given distinctive ornaments. This results in six subdivisions, described below.

(i) Landscaped ground

This category covers ground - principally industrial estates but including some recent housing developments and the new landfill site at Morley Grease Works - where the entire area has been so modified by major earth-moving that little vestige of the original topography remains. In such areas it is virtually impossible to determine the distribution of made ground vis-a-vis solid rock.

(ii) Back-filled quarries

In the Morley area, formerly extensive deep (up to 40 m) excavations for Thornhill Rock building stone are now filled, and no surface indications of their former extent or even existence remains. So far as possible their positions and maximum extent have been ascertained using archival material. In general no information on the nature of compaction of the fill material is available.

(iii) Back-filled opencast coal workings

There are three sites, at Mill Shaw (282 299), in Middleton (293 278) and in Beeston (300 300). Of these, the first two have been partly redeveloped; the third is in a recreation area.

(iv) Colliery Waste Tips

These tips contain a large proportion of inert materials, but there may also be a considerable admixture of coal. This material has been used locally as fill. Some of the larger tips have been landscaped and redeveloped.

(v) General Waste Tips

Information on the distribution of waste tips (including both household and industrial waste) for the period since 1973 has been supplied by West Yorkshire Metropolitan District Council. Documentary information on earlier deposits could not be obtained. Several of these earlier tips have been identified, mainly on hearsay evidence; however, it is inevitable that others have not been located.

(vi) Miscellaneous Made Ground

This category includes major road and motorway embankments, railway embankments, quarry tips, tunnel tips and general constructional areas for playing fields, industrial and housing development, and other man-made features of unknown purpose. Within any development area such deposits are widespread, and in many instances their presence may be determinable only by detailed site investigation.

ECONOMIC GEOLOGY

Coal, ironstone, fireclay, sandstone and shale have all been produced in the area. Only sandstone (for building) and shale (for brick-making) are still worked.

(i) Coal

The deep-coal mining industry has ceased production in this area, and no further working is envisaged as economic reserves are largely exhausted. Its current importance lies in the legacy of shafts and disused workings, many at shallow depth, that is present in many areas.

Three small opencast-coal sites, at Mill Shaw (Beeston), at Nabs End, Middleton (Adwalton Stone), and at Beeston (Middleton Eleven Yards) have been worked. Several others have been explored, and there is scope for some further extraction, though the high density of development means that any sites would be of small extent.

(ii) Ironstone

The mudstones above the Black Bed Coal were worked around Churwell and Beeston for the ironstone nodules they contain. Shallow pits in the Middleton Park Wood were reputedly for ironstone at about the horizon of the Middleton Little Coal. Some working took place at West Ardsley in shelly ironstones from above the Adwalton Stone Coal. Sideritic ironstones of this type are no longer of any economic importance.

(iii) Fireclay

The seatearth beneath the Better Bed Coal was worked with the coal at a number of localities in South Leeds, and workings at this level from Middleton Broom Pit extend a short distance into the area. in the extreme north-east.

(iv) Sandstone

The Thornhill Rock, the lower part of which is a high-quality building stone, has been extensively quarried in the Morley and Howley Park areas, to depths of over 40 metres. Most of these workings are now back-filled and landscaped. Their approximate former extent is shown on the map. Current extraction is

confined to a small area (268 262) east of Howley Park Industrial Estate. Elsewhere, local workings in this sandstone and others, including the Haigh Moor Rock around Westerton, are now disused and largely obliterated.

(v) Shale

The upper, shaly part of the Thornhill Rock, together with the overlying siltstones and fine-grained sandstones, have been, and are still, worked at Howley Park for red brick production. Shaly strata above the Haigh Moor Coal were worked east of Bantam Grove for the same purpose.

ENVIRONMENTAL GEOLOGY MAP

Four environmental geology maps have been produced to illustrate various aspects of the geology of the Morley area as these relate to present and future developments. The maps cover: (i) Distribution of Made Ground; (ii) Distribution of Drift deposits (iii) Constructional materials resources; and (iv) Underground mining.

MAP 1: Distribution of Made Ground

Six categories of Made Ground are distinguished on this map. The categories are listed and these deposits discussed on pages 12-13.

MAP 2: Distribution of Drift Deposits

The extent of Till and alluvial deposits is shown on this map. In addition, Head (solifluсted material) is widespread. Because it is thin and lacking in distinguishing characteristics it is hard to delimit and has not been shown. The deposits are discussed on page 11.

MAP 3: Constructional Materials Resources

In general, almost all Carboniferous rocks, apart from seatearths, coals and carbonaceous shales, can provide a source of constructional materials. Most of the sandstones have in the past been used locally for building purposes, and siltier beds have been fired for brick-making. Their former widespread extraction is testified to by the numerous records of small quarries and pits. At present the use of these deposits is restricted to those that satisfy modern constructional standards with regard to strength and chemical composition. For this reason, only the distribution of strata currently in production is indicated; no tests have been made to ascertain the quality or suitability of untested areas.

In practice, although shaly strata above the Shallow Wood Coal were formerly worked for brick-making materials east of Bantam Grove, only the Thornhill Rock around Howley Park is currently exploited. Two facies are present (see page 6-7). The lower, massive part of the sandstone provides high quality building and ornamental stone, and is currently worked in high faces. The upper part is generally cross-bedded and is mainly waste. However,

around Howley Park, where the lower sandstone was formerly worked from a number of deep pits, the upper part passes laterally southwards by interdigitation into a shaly facies, and these beds are worked for brick-making.

The areal extent of the Thornhill Rock outcrop is shown on the map, on which are also indicated the positions of former quarries where the stone has been exhausted. These workings are concentrated in the Morley- Howley Park area. The main part of the outcrop is sterilized by housing development. At present rates of production, considerable resources of both building stone and brick-shale remain in the vicinity of the existing quarries.

MAP 4: Underground Mining

Coal has been extracted in this area since the late eighteenth century, but all mining has now ceased. Records and large-scale plans of abandoned mines held by the National Coal Board have been examined and provide some information on the extent of disused workings. However, many of the older workings have no known plans. Their presence must be inferred from boreholes, old shafts and tips, and from archival information. Old coal workings are present at depths ranging from immediately subsurface to over 300 m. An arbitary depth of 30 m has been chosen to separate shallow and deep workings.

On the environmental map, three categories of ground are shown: (a) Areas where coal is known, or inferred, to have been worked less than 30 metres below rockhead; (ii) Areas where coal is known, or inferred, to have been worked at depths greater than 30 metres below rockhead; and (iii) Areas where no workings are known. Particular care is required when developments are planned in areas where the thicker coals (Beeston, Middleton Main) are close to the surface, as old pillar and stall workings may stand open for many years, possibly collapsing only after changes in groundwater conditions or after overloading at critical points such as roadway intersections.

The map also shows positions of mineshafts, though it is unlikely that all have been located. The information given on the

underground mining map is generalised. For detailed information on former shafts and mining subsidence problems, reference should be made to the National Coal Board (see page 3).

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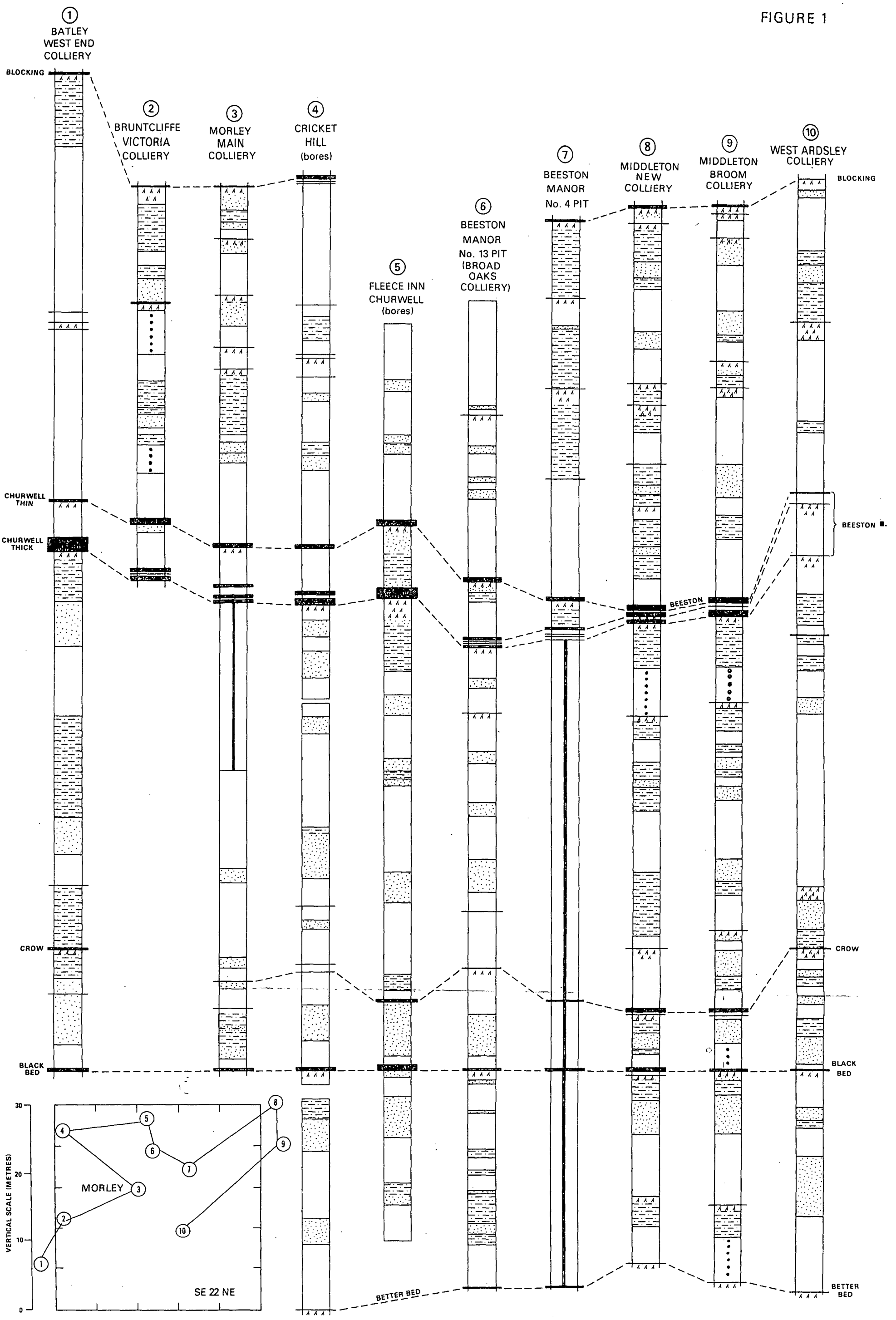
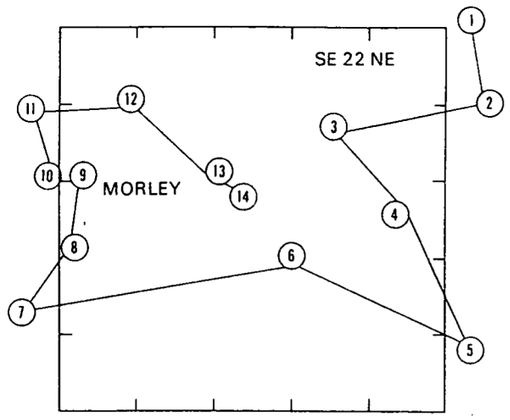
FIGURE 1


① BATLEY WEST END COLLIERY
② BRUNTCLIFFE VICTORIA COLLIERY
③ MORLEY MAIN COLLIERY
④ CRICKET HILL (bores)
⑤ FLEECE INN CHURWELL (bores)
⑥ BEESTON MANOR No. 13 PIT (BROAD OAKS COLLIERY)
⑦ BEESTON MANOR No. 4 PIT
⑧ MIDDLETON NEW COLLIERY
⑨ MIDDLETON BROOM COLLIERY
⑩ WEST ARDSLEY COLLIERY
BLOCKING
CHURWELL THIN
CHURWELL THICK
BEESTON
CROW
BLACK BED
BETTER BED
VERTICAL SCALE (METRES)
30
20
10
0
MORLEY
SE 22 NE



VERTICAL SCALE (metres)
30
20
10
0

(2) MIDDLETON BROOM COLLIERY
(4) WEST PIT MIDDLETON COLLIERY
(5) EAST ARDSLEY COLLIERY
(6) WEST ARDSLEY COLLIERY
(7) BATLEY WEST END COLLIERY
(8) BRUNTCLIFFE VICTORIA COLLIERY
(9) NEPSHAW LANE (bores)
(10) DEAN HALL COLLIERY (EDWARD ACKROYD'S PIT)
(11) GILDERSOME STREET COLLIERY
(12) HUGHENDEN (bores)
(13) MORLEY MAIN COLLIERY
(14) GILROYD MILLS, MORLEY (bore)
(1) MIDDLETON NEW COLLIERY
(3) BEESTON MANOR No. 2 PIT

2nd BROWN METAL
3rd BROWN METAL
MIDDLETON LITTLE
MIDDLETON MAIN
MIDDLETON ELEVEN YARDS
BLOCKING

ADWALTO STONE
ADWALTO BLACK
1st BROWN METAL
2nd BROWN METAL
3rd BROWN METAL
MIDDLETON LITTLE
MIDDLETON MAIN
MIDDLETON ELEVEN YA
BLOCKING

VERTICAL SCALE (metres)

30

20

10

0

BECK BOTTOM STONE COAL

SWALLOW WOOD COAL

HAIGH MOOR COAL

THORNHILL ROCK

JOAN

ADWALTON STONE

JOAN COAL

ADWALTON STONE COAL

(1) WEST PIT MIDDLETON COLLIERY

(2) BANTAM GROVE (bores)

(3) WEST ARDSLEY COLLIERY No. 2 PIT

(4) WEST ARDSLEY RAILWAY CUTTING

(5) EAST ARDSLEY COLLIERY

(6) RED PIT ARDSLEY

(7) BLACK GATES (bores)

(8) GEO. ARMITAGE BRICKWORKS (bores)

(ARG)

(9) SOOTHILL WOOD COLLIERY AND BORES

(10) HOWLEY PARK (bore)

(11) BRUNTCLIFFE VICTORIA COLLIERY

(12) HUGHENDEN (bore)

(13) PROSPECT MILLS MORLEY

(14) MORLEY MAIN COLLIERY

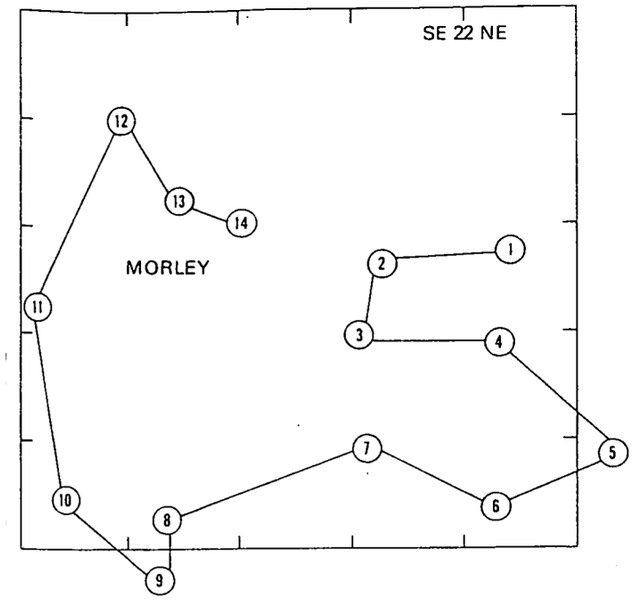


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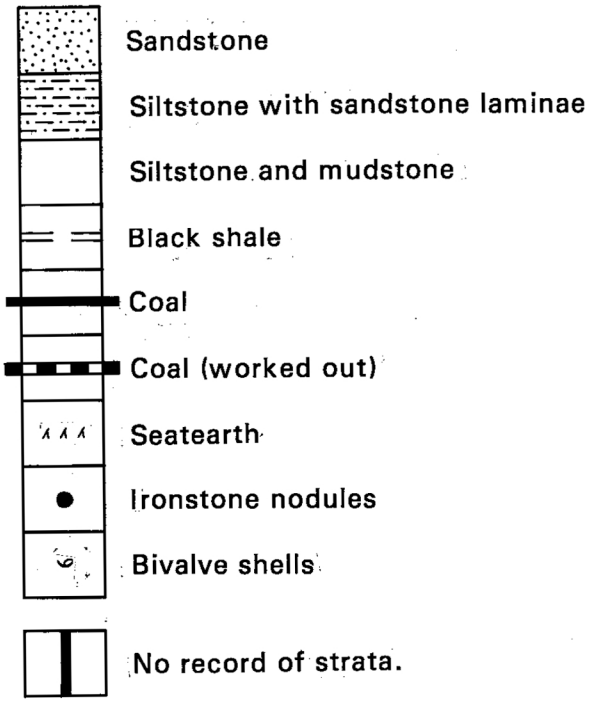
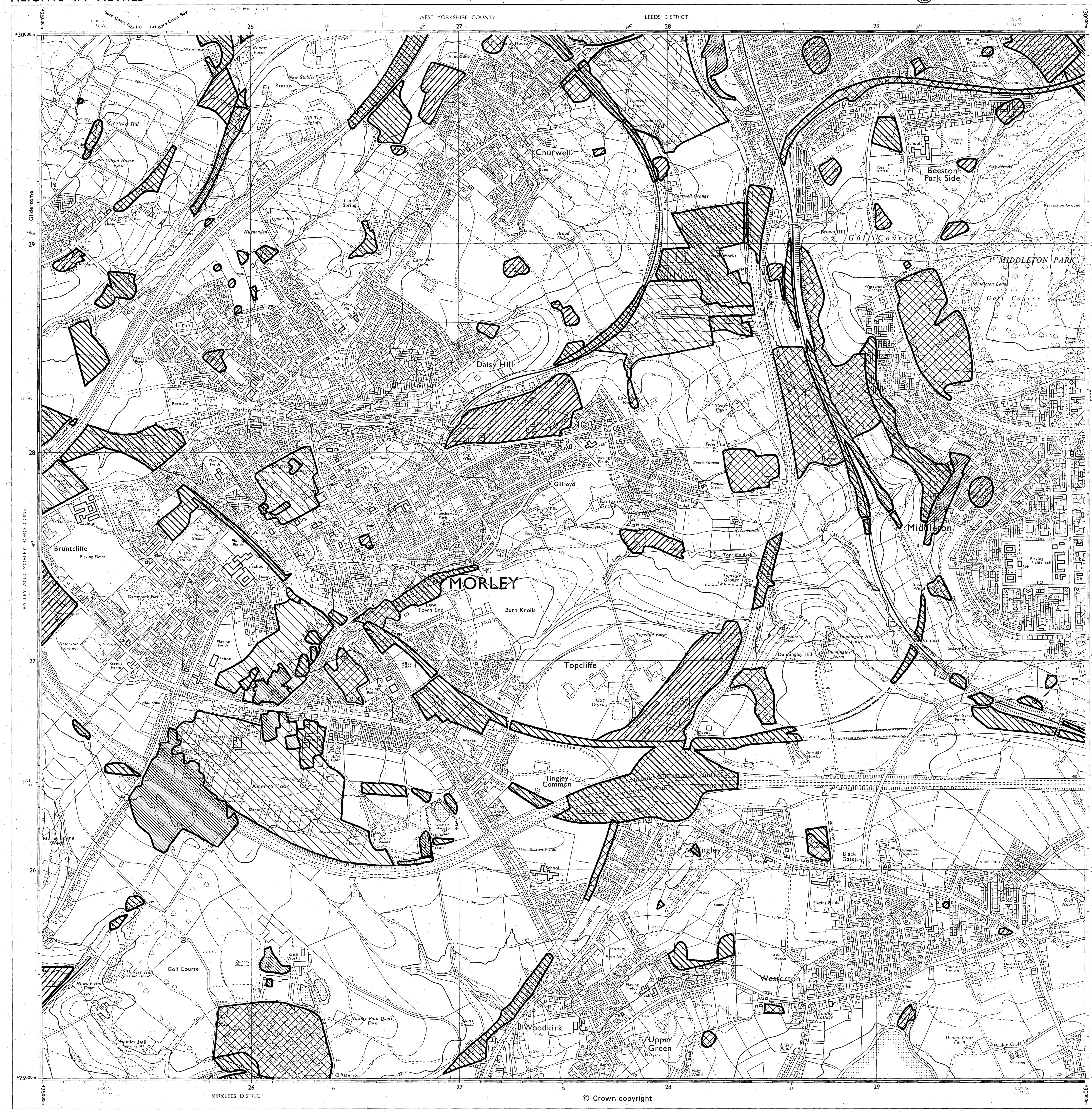
FIGURE 4

INDEX TO FIGURES 1, 2 & 3.



HEIGHTS IN METRES ORDNANCE SURVEY SHEET SE 22 NE



Institute of Geological Sciences

Environmental Geology Maps
(Morley)

1:10 000 Scale
Sheet SE 22 NE

MAP 1 **Distribution of Made Ground**

Based on a 1:10 000 geological survey by I.C.Burgess, A.J.Wadge and C.G.Godwin, 1982-3, J.I.Chisholm, District Geologist.
G.M.Brown, D.Sc., F.R.S., Director, Institute of Geological Sciences.

Production of this map was supported by the Department of the Environment.

Landscaped ground

Made ground, undifferentiated

Backfilled quarries, nature of fill unknown

Backfilled opencast coal workings

Colliery waste tips

General refuse tips

Outlines of old quarries, now backfilled, and of many areas of made ground, are derived from documentary sources. It is not claimed that all such quarries and deposits have been located, or that the limits shown are accurate.

The 'Landscaped ground' category comprises areas such as industrial estates, where the original topography has been extensively remodelled by earth-moving and tipping. Made ground is widespread, but its extent cannot be determined.

A geological account accompanies this map:

Burgess, I.C., 1983. Geological notes and local details for 1:10 000 sheets: Sheet SE 22 NE (Morley). (Leeds; Institute of Geological Sciences).

Any enquiries regarding this map should be directed to:

Institute of Geological Sciences.
Nicker Hill
Keyworth
Nottingham NG12 5GG

This map is to be used only for preliminary studies and is not intended as a substitute for on-site investigation.

This map gives an interpretation of data available at the last date of survey. Additional information is available in I.G.S. files.

WA/DM/83/001

HEIGHTS IN METRES

ORDNANCE SURVEY

SHEET SE 22 NE

Institute of Geological Sciences

Environmental Geology Maps
(Morley)

1:10 000 Scale

Sheet SE 22 NE

MAP 2 **Distribution of Drift Deposits**

Based on a 1:10 000 geological survey by I.C.Burgess, A.J.Wadge and C.G.Godwin, 1982-3, J.I.Chisholm, District Geologist.
G.M.Brown, D.Sc., F.R.S., Director, Institute of Geological Sciences.

Production of this map was supported by the Department of the Environment.

Alluvium

Boulder Clay

A geological account accompanies this map:

Burgess, I.C., 1983. Geological notes and local details for 1:10 000 sheets: Sheet SE 22 NE (Morley). (Leeds; Institute of Geological Sciences).

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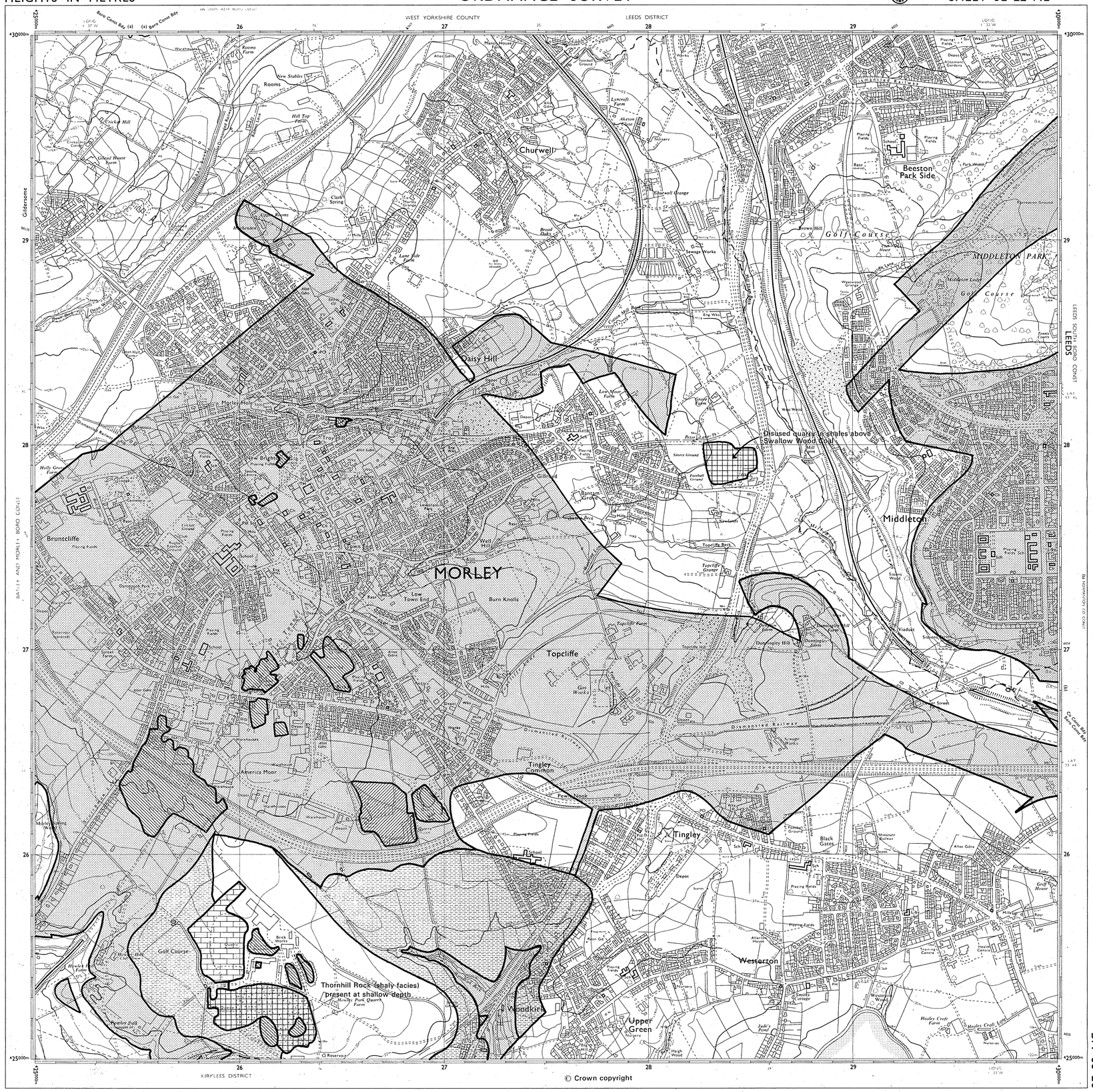
HEIGHTS IN METRES

ORDNANCE SURVEY

SHEET SE 22 NE



SE 22 NE

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Environmental Geology Maps
(Morley)

1:10 000 Scale
Sheet SE 22 NE

MAP 3 **Constructional Materials Resources**

Based on a 1:10 000 geological survey by I.C.Burgess, A.J.Wadge and C.G.Godwin, 1982-3, J.I.Chisholm, District Geologist.
G.M.Brown, D.Sc., F.R.S., Director, Institute of Geological Sciences.

Production of this map was supported by the Department of the Environment.

Thornhill Rock (Building stone) outcrop

Thornhill Rock, shaly facies (Brick-making material) outcrop

Building Stone quarries

Building stone quarries, disused

Brick-making material quarries

Brick-making material quarries, disused

Outlines of old quarries, now backfilled, and of many areas of made ground. are derived from documentary sources. It is not claimed that all such quarries and deposits have been located, or that the limits shown are accurate.

A geological account accompanies this map:

Burgess, I.C., 1983. Geological notes and local details for 1:10 000 sheets: Sheet SE 22 NE (Morley). (Leeds; Institute of Geological Sciences).

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HEIGHTS IN METRES

ORDNANCE SURVEY

SHEET SE 22 NE

Institute of Geological Sciences

Environmental Geology Maps (Morley)

1:10 000 Scale
Sheet SE 22 NE

MAP 4 **Underground Mining**

Based on a 1:10 000 geological survey by I.C.Burgess, A.J.Wadge and C.G.Godwin, 1982-3, J.I.Chisholm, District Geologist.
G.M.Brown, D.Sc., F.R.S., Director, Institute of Geological Sciences.

Production of this map was supported by the Department of the Environment.

Workings known or inferred at 0 to 30m depth below rockhead

Workings known or inferred at depths greater than 30m below rockhead

*Worked-out opencast coal sites

No record of mining

Mine shaft, abandoned
Whilst efforts have been made to trace the sites of mine shafts, it is not claimed that all have been located. For information on exact positions and conditions of shafts, application should be made to the National Coal Board.

All boundaries are generalized and therefore imprecise. For detailed information on the large-scale abandonment plans of the relevant seams should be examined. For such information and for information on present and future mining, underground or opencast, application should be made to the National Coal Board.

*Old coal workings are present at depths ranging from immediately sub-surface to over 300m. An arbitrary depth of 30m below surface has been chosen to separate shallow and deep workings. For information on the conditions of old workings, application should be made to the National Coal Board.

A geological account accompanies this map:

Burgess, I.C., 1983. Geological notes and local details for 1:10 000 sheets: Sheet SE 22 NE (Morley). (Leeds; Institute of Geological Sciences).

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