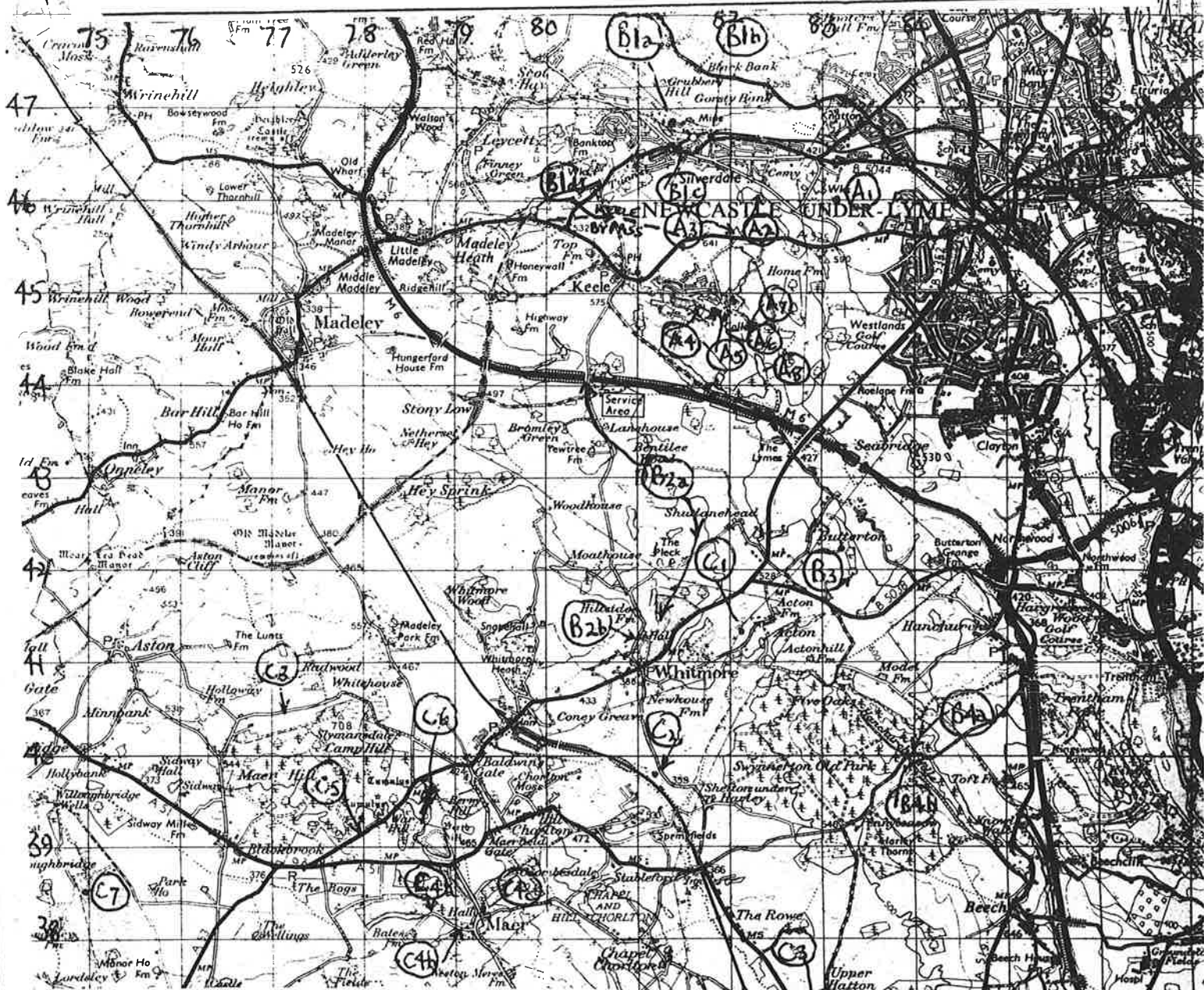


FIELD LOCATIONS AROUND KEELE COMPREHENSIVE SCHOOL

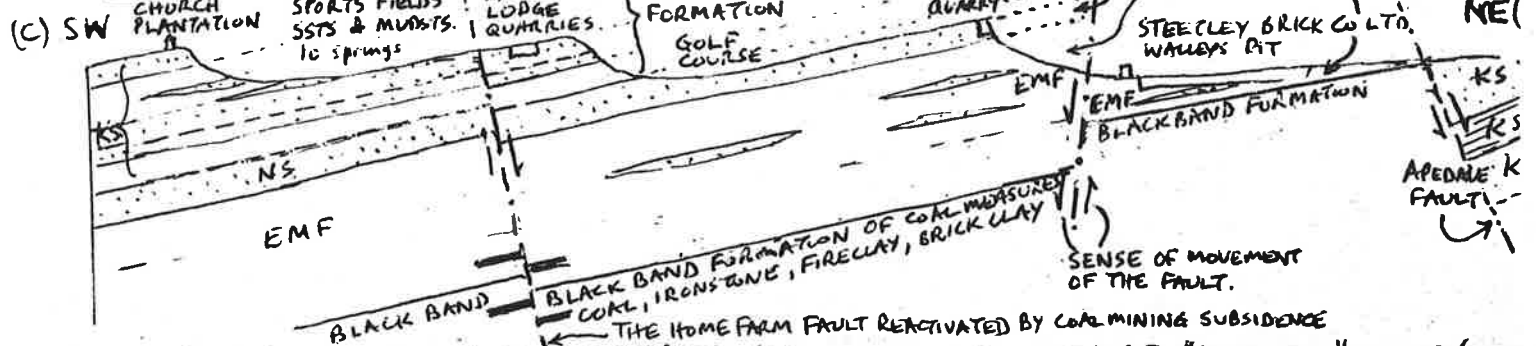


- | | |
|--|---|
| A1 WALLEY'S PIT (EMF) | B4b HANCHURCH HILLS QY (BPF) |
| A2 JOB'S WOOD (NSF) | B5 SWINNERTON WATER RESERVOIR (BPA) |
| A3 ENTRANCE QY (KSF) | B6 HIGHLWS QY (DYKES + ROADSTONE) |
| A4 KEELE TERRACE (KSF) | B7 HEAMIES CLAY PITS (DYKES + (MERCIA MUDST. GP)) |
| A5 CLOCKHOUSE DR. (KSF) | |
| A6 KEELE HALL QY (KGF) | |
| A7 LAKESIDE (KSF) | |
| A8 LAKES (PRESENT) | |
| — | |
| B1a SILVERDALE COLL. (CM) | C1 ACTON PIT (BPF) |
| B1b SILVERD. CHURCH | C2a PUMPING STN (NTR) |
| B1c THE VILLAS | C3 HATTON PUMP STN |
| B1d THE KEELE BYPASS BRIDGE | C4a MAER - VIEW OF "MAER HILLS QY" 67 ACRES |
| B2a BROMLEY ZONE SILVERDALE NEW PIT (GREAT ROW SEAM) | C4b MAER - VIEW OF HALL - DARWIN'S PENCIL SKETCH - C ORIGIN OF SPECIES + SOIL PROBLEM |
| B2b WHITMORE MILL (BPF) | C4c MAER CHURCH: ST PETERS |
| B3 BUTTERTON CHURCH WOOD QY (DYKE) | C5 ROAD CUTTING (BPF) |
| B4a HANCHURCH HILLS ROADSIDE (DARWIN + DYKE) | C6 RED HILL RIFLE RG. ECOLOGY - SOIL |
| | C7 WILLOUGHBRIDGE QY |
| | C8 NORTH SIDE MAER HILLS |

SCIENCE OUT OF DOORS: OPPORTUNITIES AROUND KEELE COMPREHENSIVE SCHOOL

1. MONITORING AND INVESTIGATING THE WEATHER

2. LANDSCAPE AND STRUCTURE



3. LOCALITY A3 NORTH LODGE QUARRIES 20m x 20m x 5m IN K.S.F. "DOMESTIC" FILL @ 10m

4. LOCALITY A2 JOBS WOOD QUARRY BUILDING/WALLING STONE IN NSF

5. MINING SUBSIDENCE FAULTS (A) BARNES HALL (B) ENTRANCE WOOD (C) MAIN ROAD BEND (D) APEDALE FAULT (E) MILLBANK FAULT

6. THE STEELEY BRICK & TILE CO LTD - WALLEY'S PIT (A) 500 x 500 x 30m @ 2.5 tonnes of ETRURIA MUDSTONE FM UPPER CARBONIFEROUS 300mya. FLUVIAL OVERBANK MUDS & SOIL PROFILE: PALAEO-MAGNETISM. 0° (= EQUATORIAL LATITUDES) - A WASTE-FILL SITE? A GYPSY CARAVAN SITE?

7. SILVERDALE VILLAGE (B) THE CLOUGHS, THE VILLAS, SILVERDALE HOUSE, THE PIT, THE GRAVEYARD:

AT 17 - THE LORD JOHN CADMAN STORY SCIENCE-TECHNOLOGY & INTERDISCIPLINARY STUDIES, TRAVEL VIA QUARRYBANK ROAD TO THE BRIDGE OVER THE KEELE BYPASS. THE SCIENCE & TECHNOLOGY OF ROADS, CUTTINGS, ETC. TRAVEL TO KEELE SERVICES AND WHITMORE. THE AREA OF THE NEW SILVERDALE COALMINE. SCIENCE OF "INNER SPACE".

8A
8B
9. THE ACTON SAND & GRAVEL PIT (CANNOCK CHASE PEBBLE BEDS 245mya TRIASSIC). 1000 x 500 x 3 at £8-10 per tonne; 2.5 tonnes per m³. A COALBOARD LANDFILL SITE (INERT OR TOXIC WASTE (SEE LOCALITY C1). EFFECT ON WATER SUPPLY.

10. LOCALITY C2 THE WATER PUMPING STATION, WHITMORE. FARMER ANDREW HILL v SEVERN TRENT WATER PLC AND THE EEC COMMISSION... THE NITRATE PROBLEM. POSSIBLY FOLLOWED BY A VISIT TO THE WATER PUMPING STATION OF VICTORIAN TIMES AT UPPER HATTON (C3)

11. MAER VILLAGE. LOCALITIES C4a...VIEW OF MAER HILLS & PROPOSED 65 acre SAND & GRAVEL QUARRY TO NORTH, LOCALITY C4b VIEW OVERLOOKING MAER HALL, LOC. C4c MAER CHURCH AT 17 DARWIN & EVOLUTION THE PENCIL SKETCH OF "THE ORIGIN" WRITTEN HERE IN 1842; THE NEW THEORY OF THE ORIGIN OF SOIL GENERATED HERE IN 1837 (SEE DARWIN 1882). SEE ALSO HAPPS (1982) PAPER ON NEW ZEALAND CHILDREN'S IDEAS ON THE ORIGIN OF SOIL.

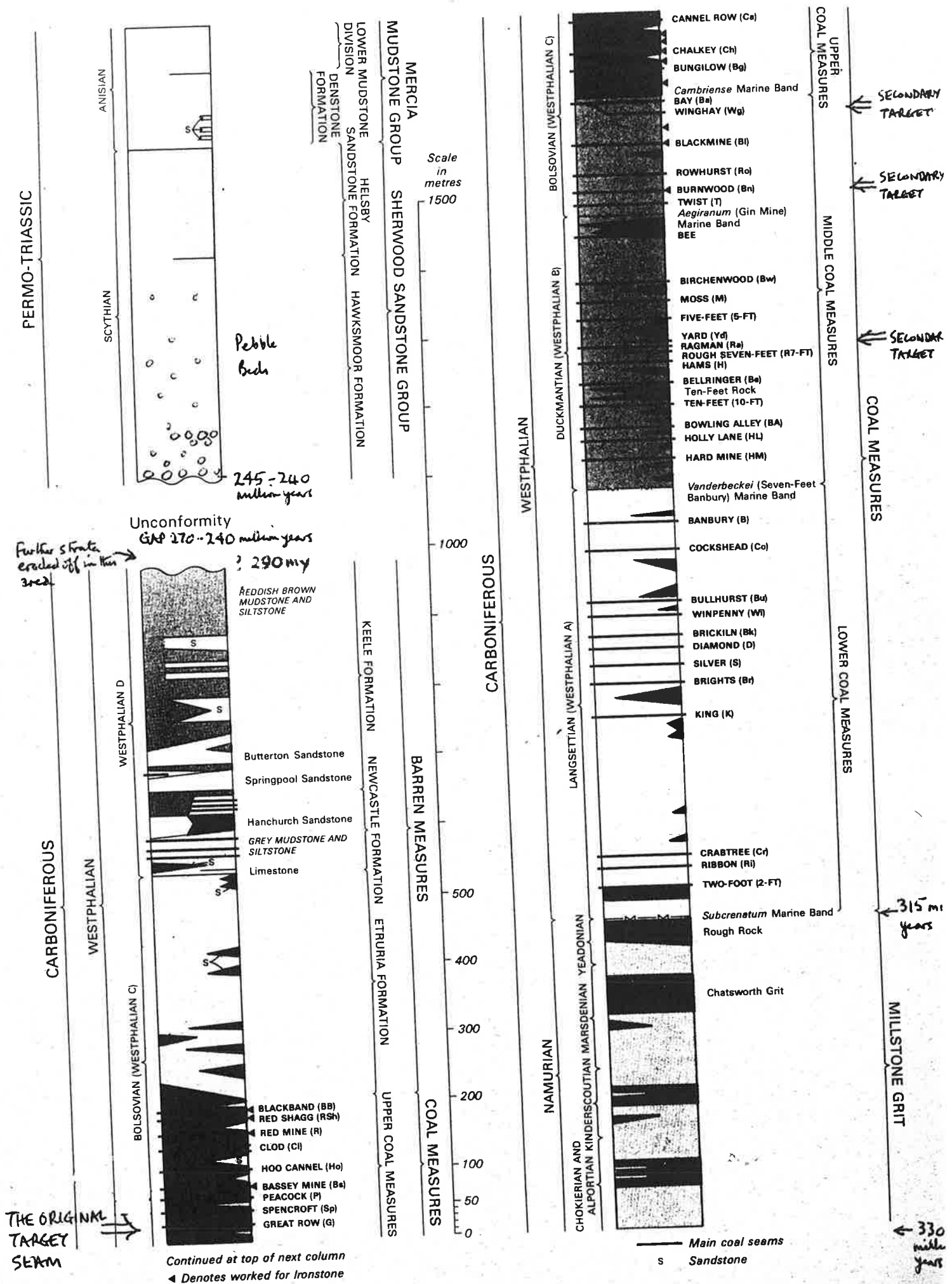
12. LOCALITY C6 RED HILL RIFLE RANGE QUARRY. PAST USES: BUILDING STONE, CONSTRUCTION SAND, MOULDING SAND FOR CRANE LOCO. WORKS @ £10-15 per tonne. PRESENT USES: RIFLE RANGE, EARTH SCIENCE STUDENTS' TRAINING GROUND; LOCAL WALKS, BIRD WATCHING; FUTURE USES: NATURAL RESOURCES CONSERVATION AREA;

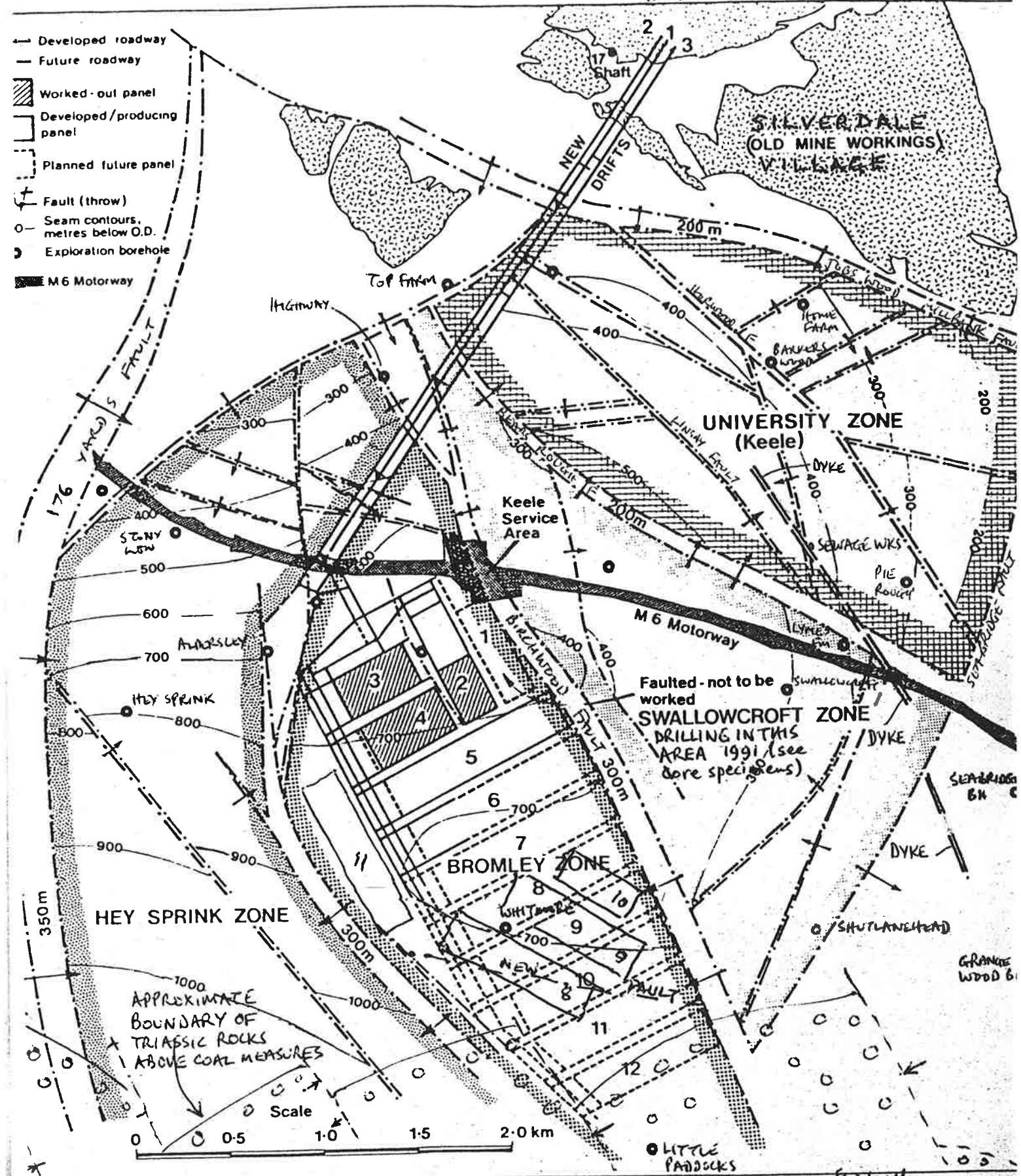
13. TRAVEL THROUGH MAER HILLS: SITE OF AN EXPLOITATION v AMENITY CONTROVERSY: PUBLIC ENQUIRY 8th MAY 1990 EXPLOITATION FOR GRAVEL & SAND OVER 65 ACRES & 25 YEARS GRAVEL £4-80 per tonne, SAND £3-8 per tonne. 2.5 tonnes per m³. NEED FOR MUCH WATER; DUST, NOISE, AMENITY WOODLAND VIEWS & WALKS; ECOLOGY: WOODLAND, HEATH, BIRDS; HISTORICAL INTEREST: BRONZE & IRON AGE HILLOCKS, DARWIN'S CONNECTIONS; EFFECT ON WATER SUPPLY AND SAFETY (200 LORRY MOVEMENTS PER DAY), CONSERVATION INTERESTS, ALTERNATIVE SITES AVAILABLE.

14. VISIT WORKING SAND & GRAVEL COMPANY, AMEY ROADSTONE CO. WILLOUGHBRIDGE CANNOCK CHASE PEBBLE BEDS (245mya TRIASSIC) BROKEN/EXCAVATED BY CATERPILLAR GRADER, PICKED UP BY FACE SHOVEL, LOADED TO FIELD CONVEYOR BELT, TRAVELLING TO INTERMEDIATE PRODUCT PILE; FIELD CONVEYOR TO TREATMENT WORKS, WASHING, SORTING, CRUSHING; SILT & CLAY TO FIELD LAGOON; SAND TO SAND PILE; GRAVEL CRUSHED/SORTED TO TWO SIZES AND THEN TO PRODUCT PILE.

TYPES OF MATERIAL & ORIGINS
PALAEO-CURRENT STRUCTURES & ORIGINS.
ECONOMIC CONSIDERATIONS: SIZE OF PIT, VOLUME; PRICE OF PRODUCTS SAND ONCE £3 per tonne now £8; GRAVEL ONCE £4 now £10; 2.5 tonnes per m³.
VALUE OF THE HOLE FOR DOMESTIC/INDUSTRIAL WASTE TIP: "GREEN" ISSUES re POLLUTING THE WATERTABLE AS AT ACTON

15. KEELE CHURCHYARD STUDY: ESTA SCIENCE OF EARTH UNIT 1. "WILL MY GRAVESTONE LAST". TESTING AND IDENTIFICATION OF GRAVESTONES. ALTERNATIVE UNIT "NEIGHBOURHOOD STONE WATCH" ESTA S of E UNIT 8.





Plan of Silverdale New Mine showing major faults, colliery workings and depths below O.D. in the Great Row Seam.



SURFACE POSITION OF
LARNOCK CHASE PEBBLE BED Fm.

TEMPERATURE GRADIENT
SURFACE TEMPS IN SOIL

25°C per km
11-13°C say 10°C for
purposes of calculation



Keele Bypassed At Last

The bypass was opened by seven-year-old Guy Gibbs, a pupil at Baldwin's Gate C. E. Primary School on July 30th.

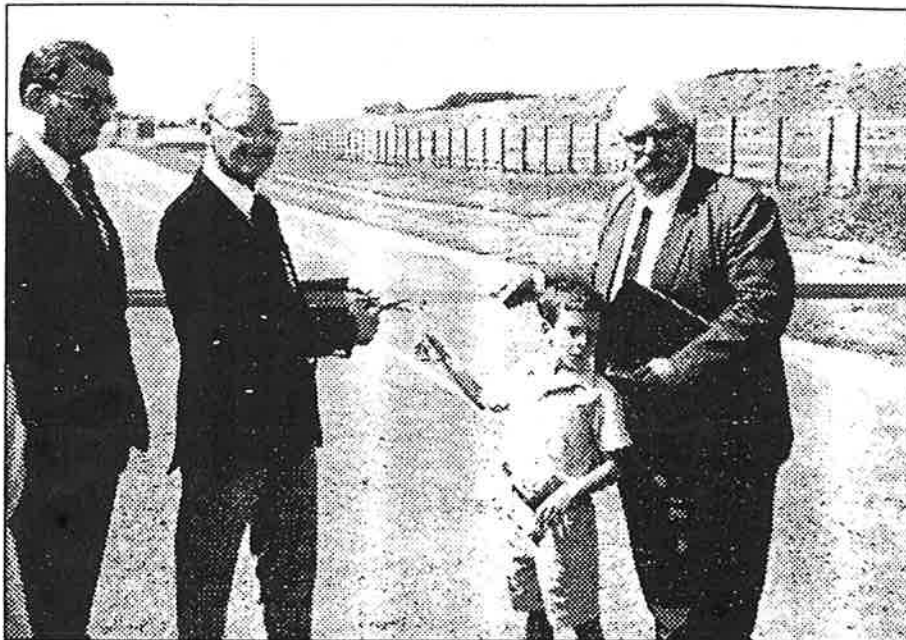
Twenty Years Ago

It was twenty years ago that the first proposal to bypass Keele was accepted by the Department of Transport. In the intervening years the proposal was abandoned, revived, public consultations and objections heard until in June 1990 the Orders and Amendments were confirmed; work began in May 1991.

Nail Biting Finish

Only one week before the proposed opening ceremony, Wrekin construction and site engineers from Staffordshire County Council were working round the clock to immobilise landslips on the north side of the Quarry Bank bridge.

Contractors pile-drilling near the bridge



Guy Gibbs, centre, with Councillor Bill Hughes to the left and Terry Dix, Chairman of County Highways Dept., right.

"Although the work has been completed three months ahead of schedule, the road could have been operational even earlier but for the vagaries of geology. Apparently, a geological feature not easily detectable by test boring caused two significant land-slips in the embankment both to the east and to the west of the new Quarry Bank bridge. That to the east was detected early on and dealt with during the course of the construction work but the appearance of the western slippage was perhaps delayed by the fact that a causeway was left across the cutting to provide continuous pedestrian access along Quarry Bank until the new bridge was open. Once it was discovered many hundreds of tons of earth were removed from the embankment and replaced with limestone rubble but the embankment adjacent to the bridge abutment could not be treated in this way. Accordingly, a spectacular quantity of earth was piled up over half the new carriageway to provide a platform approximately half way up the embankment for a massive piling machine which drilled holes for a row of 11 reinforced concrete piles approximately 15ft. deep. It is to be hoped that these will be sufficient to counteract the underlying geological forces!"

Yew Tree Correspondent

Accident Record

There has been a history of serious accidents including fatalities on the A525 in the Keele area. Between November 1983 when the Keele accident record began, to the opening of the bypass on July 30 1992, 133 accidents were reported to the Parish Council as having occurred within the Parish. 44 of these accidents took place in the very centre of the village, i.e., in the area of the Yew Tree, the Sneyd Arms and the Post Office/Village Shop.

Guy's Big Day

County Highways Department set up a children's competition at the County Agricultural Show in May 1992 which was won by Guy Gibbs who received as the "prize" the chance to be the star of the opening ceremony. His name is recorded on the plaque atop the brick pedestal at the Boggs Cottage turn, he received several County mementoes and the whole of his school class will be taken to Shugborough when school re-opens in the autumn.

BBC Midlands television showed a brief clip of Guy at the ceremony on Midlands Today regional news. Guy

Continued on Page Two.

Parish Council News

Continued from Page Two

effect, against the rejection of the Home Farm outbuildings.

Copies of the Chairman's report may be obtained, together with the Statement of Accounts for the year, from Mrs S E Barnard, Parish Clerk.

As the Chairman said at the meeting, the financial position for the Parish Council is very healthy, the village not having costly sports grounds or playgrounds to provide for. He requested input from residents on how the Parish Council should spend its income to improve the village.

Keele Parochial Charities

...also submitted their balance sheet at the Annual Meeting. There was no report since the ways in which the funds have been spent are necessarily confidential and involve grants to residents in the village at the discretion of the trustees, any of whom may be contacted about special cases of hardship or need in the village.

Trustee: Mrs M J Capper

Trustee: Mrs A Drakakis-Smith

Cooperative Trustee: Mr N Richards.

Mr Richards has now retired from this position. He was thanked by Dr Studd for his many years of service.

Keele Campus Supermarket

MORE THAN MOST!

Hours of Opening :

9.00 - 5.30 Monday to Friday

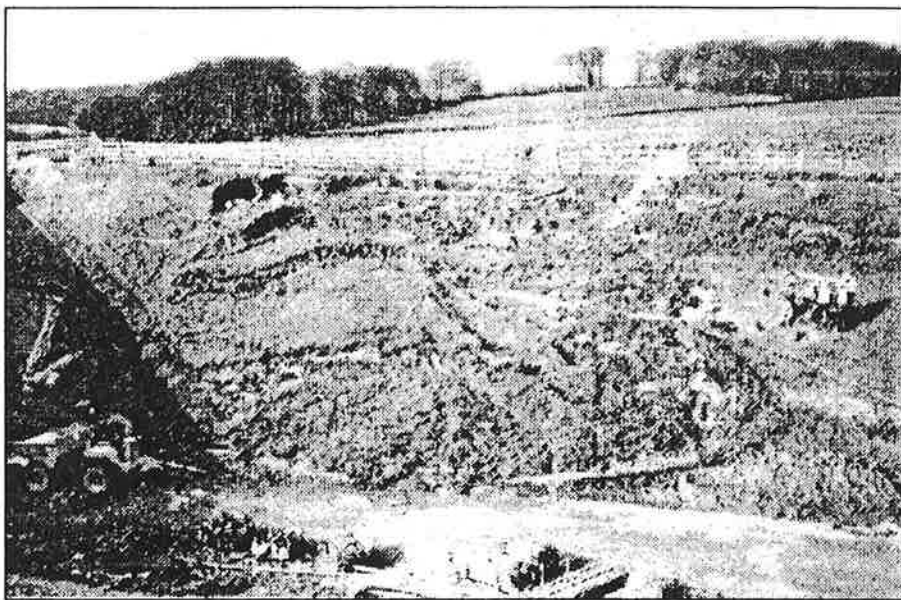
10.00 - 1.00 Saturday

10.00 - 12.00 Sunday (in term only)

Exotic Foods & Off-Licence

Tel : 0782-626600

Keele Slumps



With the winter over, steady progress continues to be made on the By-pass. The cutting excavation is now completed to its final depth, which is three metres deeper than was intended at pre-public enquiry stage, and the new Quarry Bank Road bridge is carrying traffic.

Pedestrians crossing the bridge have an excellent view of the work now being carried out to deal with an unstable area on the new cutting slope.

The local geology has proved to be quite interesting, to say the least, and whilst boreholes drilled at the pre-contract stage gave an indication of variability, the degree has been more than was anticipated.

The excavations of cutting can be relatively high-risk activity because however many boreholes are drilled before the works starts, the volume of ground actually examined in specific detail with the boreholes is about equivalent to tasting a cake by sticking a long pin into it, and then sucking the pin. This would perhaps be good enough for a sponge cake, but not much use for a sandwich cake where the sandwich layers are at differing angles, and some disappear completely in parts of the cake.

Engineers planning earthworks in such variable ground situations are therefore faced with a number of options which range from selecting cutting slope

angles which are so flat that there is no possibility of a slip occurring, to selecting a slope angle which carries what is seen to be an acceptable degree of risk.

So far as the Keele by-pass was concerned, the 'no-risk' slope angle would have involved considerable additional costs and resulted in the works needing more farm land. Instead, after analysing several slope - stability possibilities, an angle of 26.5 was chosen. It was anticipated this could result in some areas of potential instability and when the cutting excavation was in progress some ground was over-excavated and replaced with crushed rock.

However, despite these precautionary works, a slip has developed east of the new bridge in the north-side cutting and it is this which is now receiving attention. This will not delay the opening of the By-pass which will be on July 20th. The ribbon will be cut by the winner of a County Highways Quiz competition for children, held at the County Show.

The interest of the Keele parishioners in all aspects of the works is very much appreciated by the County Council.

**Written by the County
Surveyor for the Yew Tree**

Storms on the water front — but who pays the price?

MRS THATCHER'S newly acquired 'green consciousness' was reflected in the recent Queen's speech to Parliament by the intention to act on the levels of nitrate in our drinking water. The move has cheered environmentalists, disturbed farmers and posed the water authorities, already preoccupied with the impending privatisation, a new set of problems. MARTIN WELLS investigates the issues on tap.

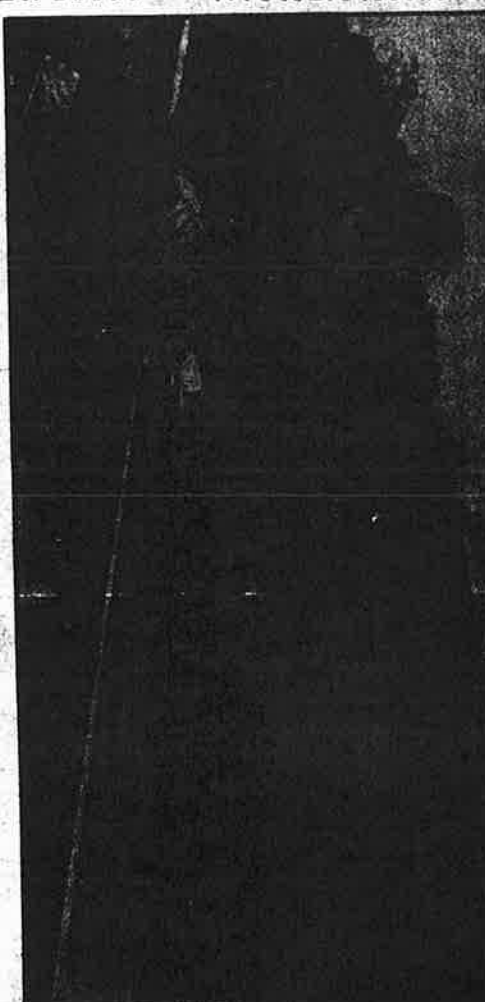
ANDREW HILL is an angry farmer. As manager of the 900-acre Whitmore Estate producing 1.5 million litres of milk every year, his work has already been seriously affected by EEC quotas.

So the last thing he needed was more disruption on the horizon. But, with the Government taking on board EEC recommendations limiting the amount of nitrate permitted in the water supply, that's exactly what he faces.

Nitrates are found naturally in the soil but, without man's interference, they are usually absorbed by plant life. Problems arose after the last war when, faced with a hungry planet, successive governments backed the use of artificial fertilisers containing nitrates and urged intensive farming methods to boost food production. As the European grain, butter and wine mountains proved, these methods have proved only too successful.

But the price we are now paying for the ingenuity of the agricultural scientists is abnormally high levels of nitrate in the soil. The nitrate is washed by the rain through the earth to accumulate in natural underground reservoirs and is then pumped up by the water authorities for domestic use.

Too much nitrate, say the scientists, can lead to the 'blue baby' syndrome — breathing problems in very young children — and even stomach cancer. Thus,



Prevention or cure — the nitrate debate

nitrate levels in the water have to be reduced and the generally accepted way of reducing these levels is by changing the farming methods practised and perfected over the past 40 years.

So, why is Andrew Hill angry?

The drought of 1976 caused the water authorities to review their water collection procedures and, in North Staffordshire that involved the building of a bore hole and pumping station on the Whitmore Estate to feed the Handchurch reservoir which, in turn, feeds the south-east region of the Potteries including Stoke, Newcastle and Trentham.

Now, under proposed legislation, a large area around the bore hole could be closed to all but minimal farming, reducing yields substantially in the case of the Whitmore Estate. What's more, ill-informed environmentalists are denouncing farmers as polluters of the water supply.

In the 20 years that I've been here we've increased the use of fertilisers in order to produce more grass to increase the milk yield. But in the past five years there's been no increase at all due to the imposition of milk quotas," said Mr Hill.

"What niggle is it that I'm farming in the way I've been trained. I'm a professional farm manager and I've been trained to farm by the best accepted methods. I've done it in a way which includes more fertilisers and I don't like being branded a polluter... apparently my near-neighbours who are farming in the same way aren't polluters because

Accepted methods

they haven't got a bore hole on their land!"

The Whitmore Pumping Station which supplies eight million litres of water a day to the Potteries was partly the subject of a recent study on the nitrate levels conducted by the Government and the Severn-Trent Water Authority in co-operation with farmers. It revealed that nitrate levels in this water collected in this special catchment area have risen since the war to its current position of around 35 parts of nitrate per million of water — well below the EEC limit of 50 ppm but almost twice the level recorded in 1950.

Water experts estimate that if the status quo remains the EEC level could be reached within ten years and could reach danger levels in other parts of the country unless some action is taken.

One of the authors of the study, Dr Bob Breach summarised the present level of nitrate as a pollution problem caused by farming activities but added: "Farmers can't be blamed — what's coming out of the ground now is what went into it 20 years ago."

What's more, not all intensive farmers are to blame. It's only a problem in those areas where water-bearing rocks like sandstone come to the surface.

Prevention or cure

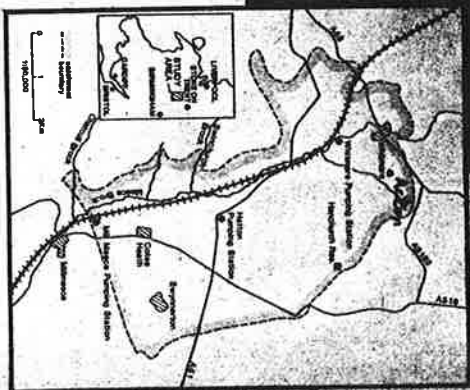
The solution, in his view, can either be prevention — changing farming practices to reduce the levels of nitrates in ground water — or cure — treating the water once it's been collected by the authorities. This latter suggestion, involving increased sterilisation costs, would mean passing this cost on to the consumer.

Estimates put the cost of the prevention, including compensating farmers for loss of yield, and the cure at about the same — £40 million. Dr Breach, the Severn-Trent water supplies manager, prefers prevention.

"Our view is that there's four bodies who can pay the price: there's the farmer personally, but that would be unfair, there's the EEC, but that's unlikely, and there's the water consumer or the Government." All the signs are that it will be the Government via the taxpayer who will pay.

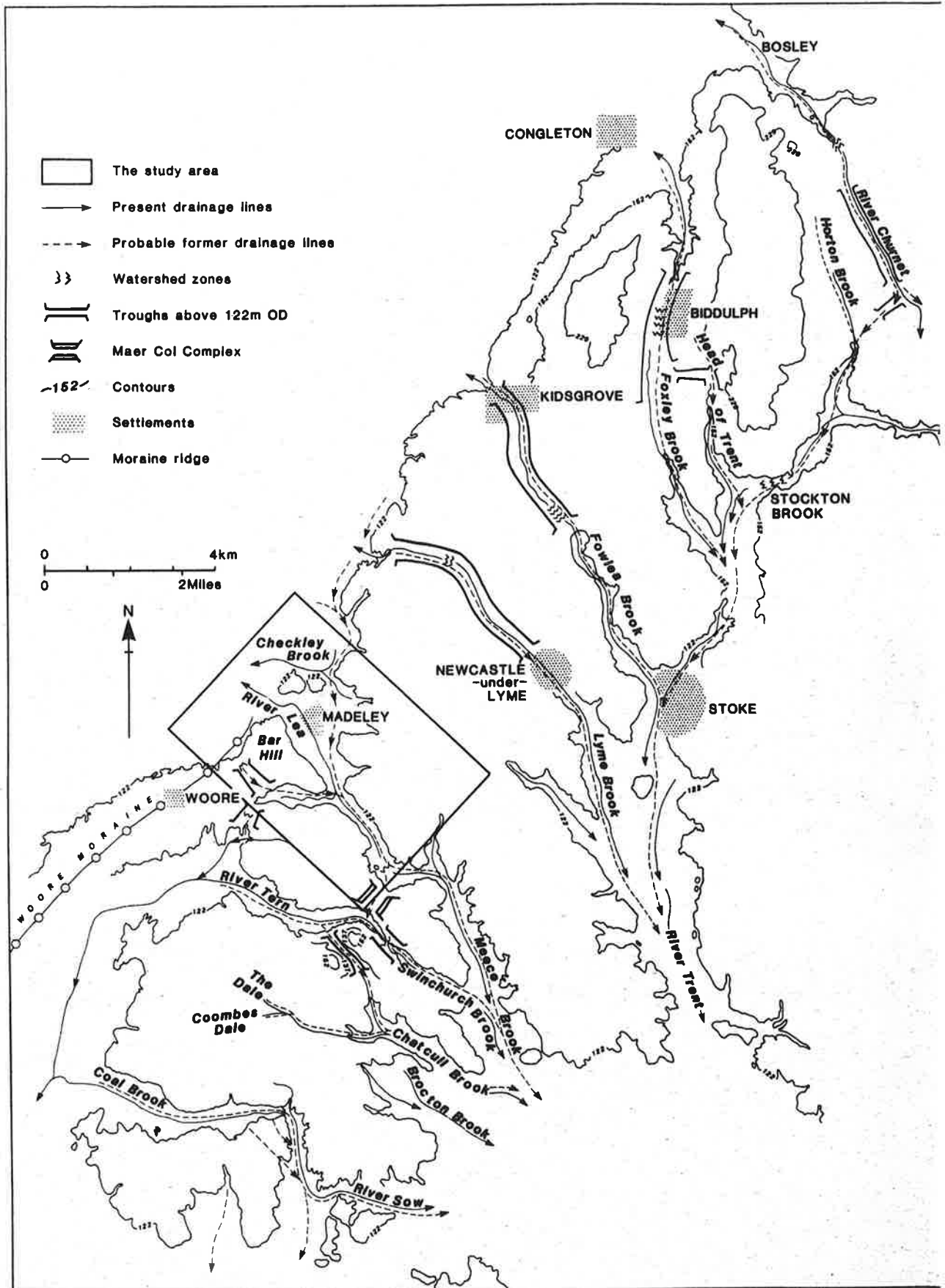
Andrew Hill, meanwhile, who co-operated in the preparation of the study, insists the entire problem relating to nitrates has been grossly exaggerated. He's right that there have been no 'blue baby' cases in this country since 1972 and stresses that any connection with stomach cancer has

been disproved. In Lincolnshire, he said, where the levels of nitrates in the water are at their highest, people were actually less likely to die of stomach cancer than in other parts of the country.



Whitmore farmer Andrew Hill by the Handchurch Reservoir, the pumping station which can draw eight million litres of water a day up from beneath the land. Inset: a map of the Hutton catchment area featured in the official study of nitrate levels in the water supply.

Fig 3 Madeley and adjacent areas. Present and suggested former drainage patterns and major watershed breaches



[AFTER KNOWLES 1986]

SE ↓ N

THE MADELEY FAULT
THROW TO SE VERY LARGE

A little of the BFS exposed

RED HILL

BERTH HILL

GLACIAL OVERFLOW CHANNEL WITH REAT. 35 PP 1842 AT 29.1.1839
DARWIN'S THEORY OF SOIL ON WIL. DRESS' GRAFT
DARWIN'S THEORY OF SOIL ON WIL. DRESS' GRAFT
DARWIN'S THEORY OF SOIL ON WIL. DRESS' GRAFT

MAER MAER VILLAGE SCARP
HILL (WALL) NORTH-FACING

A glacial Drumlins?

THE MERCIA

MUDSTONE GROUP

and post glacial events

Carboniferous Rocks

THE SHERWOOD SANDSTONE GROUP

CARBONIFEROUS ROCKS (315 - 286 million years)

UNCONFORMABLE

Wildmoor Sandstone Formation
Conglomerate Shale Pebble Beds Formation

TRIASSIC ROCKS 248 - 230 million years old

A DRAMATIC SECTION ACROSS THE MAER HILLS & MAER

HORIZONTAL SCALE 1 : 10,000 (SIX INCHES = 1 MILE) ; VERTICAL SCALE VERY EXAGGERATED & DRAMATIC

DETAILS OF PLANNING APPLICATIONS - EXPLOITATION v CONSERVATION + AMENITY

1. THE MAER FOREST
FOR SAND & GRAVEL PIT
45 ACRES - REFUSED.
2. FOR GOLF COURSE - ACCEPTED
BUT NOT BUILT.
3. FOR TWO GOLF COURSES &
LEISURE COMPLEX & HOTEL &
HOUSES - REFUSED

1. THE MAER HILL ESTATE
FOR GOLF COURSE - REFUSED
TWICE 50 FAR
(MR BEYARD FRADLEY OF MAER HILL)