

MICKLE TRAFFORD TO ELLESMERE PORT PIPELINE, Cheshire



**Archaeological Desk-
Based Assessment,
Walkover Survey,
Geophysical Survey
and
Palaeoenvironmental
Assessment.**



Oxford Archaeology North

April 2004

United Utilities Ltd

Issue No: 2003-4/183

OA North Job No: L9314

NGR: SJ 442 707 to 423 742

Document Title: MICKLE TRAFFORD TO ELLESMERE PORT PIPELINE,
CHESHIRE

Document Type: Archaeological Desk-Based Assessment, Walkover
Survey and Palaeoenvironmental Assessment

Client Name: United Utilities Ltd

Issue Number: 2003-4/183

OA Job Number: L9314

National Grid Reference: SJ 442 707 to 423 742

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Document File X/Alison/Projects/L9314/Mickle/Report
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CONTENTS

| | |
|---|-----------|
| SUMMARY | 3 |
| ACKNOWLEDGEMENTS..... | 5 |
| 1. INTRODUCTION..... | 6 |
| 1.1 Circumstances of the Project..... | 6 |
| 2. METHODOLOGY..... | 7 |
| 2.1 Project Design | 7 |
| 2.2 Desk-Based Assessment..... | 7 |
| 2.3 Walkover Survey..... | 7 |
| 2.4 Palaeoenvironmental Assessment | 8 |
| 2.5 Geophysical Survey | 8 |
| 2.6 Gazetteer | 9 |
| 2.7 Archive..... | 9 |
| 3. BACKGROUND..... | 10 |
| 3.1 Location | 10 |
| 3.2 Geology and Topography..... | 10 |
| 3.3 Historical Background | 10 |
| 4. DESK-BASED ASSESSMENT RESULTS | 13 |
| 4.1 Introduction..... | 13 |
| 4.2 Assessment Results | 13 |
| 5. WALKOVER SURVEY RESULTS | 15 |
| 5.1 Introduction..... | 15 |
| 5.2 Identified Sites | 15 |
| 6. PALAEOENVIRONMENTAL ASSESSMENT RESULTS..... | 17 |
| 6.1 Introduction..... | 17 |
| 6.2 Results..... | 17 |
| 7. GEOPHYSICAL SURVEY RESULTS | 20 |
| 7.1 Introduction..... | 20 |
| 7.2 Results of Scanning..... | 20 |
| 7.3 Results of Detailed Survey..... | 20 |

| | |
|--|-----------|
| 8. IMPACT AND RECOMMENDATIONS | 21 |
| 8.1 The Development Area | 21 |
| 8.2 Recommendations | 21 |
| 9. BIBLIOGRAPHY | 24 |
| 9.1 Original Maps | 24 |
| 9.2 Secondary Sources | 24 |
| ILLUSTRATIONS | 26 |
| List of Figures | 26 |
| List of Plates | 26 |
| APPENDIX 1: PROJECT DESIGN..... | 27 |
| APPENDIX 2: SITE GAZETTEER..... | 28 |
| LIST OF TABLES | |
| Table 1: Sites identified during desk-based assessment | 13 |
| Table 2: Sites identified during walkover survey | 16 |
| Table 3: Pollen assessment results from palaeochannel 7 | 18 |
| Table 4: Pollen assessment results from palaeochannel 16 | 19 |
| Table 5: Impact and recommendations | 23 |

SUMMARY

Oxford Archaeology North (OA North), undertook a desk-based assessment on behalf of United Utilities Ltd during October 2003. The assessment covered a 1km corridor of land around the proposed c 4km pipeline route from Mickle Trafford Waste Water Treatment Works to Ellesmere Port Waste Water Treatment Works (NGR SJ 442 707 to SJ 423 742), which follows the course of the River Gowy (Figs 1-3).

The desk-based assessment involved a search of records held by the Cheshire Sites and Monuments Record Office (Chester) and examined both published and unpublished records. A total of 20 sites was identified from the SMR, including one Scheduled Monument (Site **3**) at Stoak. At the southern end of the proposed pipeline the development is within 1km of the suspected Chester to Wilderspool Roman road (Site **19**). The sites identified by the desk-based assessment will not be affected by the proposed development, being find spots or buildings outside the study area. The pipeline traverses an area that was not included in the North West Wetlands Survey which may help to explain the paucity of sites identified by the SMR in the Gowy Valley.

The walkover survey encountered a landscape of improved farmland with many degraded or former hedgerows with few archaeological features identifiable. Only seven sites were identified by a walkover survey (Fig 2). These comprised three possible former field ponds (Sites **23**, **25**, and **26**), three trackways (Sites **21**, **22** and **27**) and a mound (Site **24**). Of these, Sites **21**, **22**, **23** and **27** have the potential to be seriously affected by the development.

The palaeoenvironmental assessment included a survey of the gross stratigraphy of the pipeline corridor using a gouge auger at c 200m intervals (Figs 4-5b). The stratigraphy of the cores was described in the field and a number of spot samples were taken to assess the preservation of palaeoenvironmental indicators. The general stratigraphy of the area consists of sandy soil overlying stiff red clay (boulder clay) with little potential for the preservation of organic remains; however, the pipeline will traverse two identified palaeochannels where it is recommended further palaeoenvironmental work should be concentrated. Palaeoenvironmental sampling should also be carried out on the site of the former field pond (Site **23**), should it be impacted upon by the development.

The geophysical scan of the proposed pipeline route indicated a low level of magnetic response that was consistent with the soil conditions known to be present. On the basis of the results of the general survey, four areas (Areas A-D) were targeted for detailed survey (Fig 6). The detailed survey detected a group of possible archaeological anomalies in one area (Area D) though no clear archaeological pattern was present in the data.

The field pond (Site **23**), the trackways (Sites **21**, **22** and **27**), Area D of the geophysical survey and the palaeochannels could be characterised, and thus potentially mitigated, by targeted trenching as part of an archaeological evaluation programme. This could be scheduled well in advance of development timetables, thus reducing the risk of incurring delays to the construction programme. Mound **24** and ponds **25** and **26** should be avoided if possible or will need to be subject to a watching

brief. In addition to targeting the known sites, a comprehensive programme of archaeological evaluation over the route of the pipeline is considered preferable to a permanent presence watching brief, although a combination of both evaluation and watching brief may be required.

ACKNOWLEDGEMENTS

Oxford Archaeology North would like to extend thanks to the staff of the Cheshire County Record Office in Chester for their patience and helpfulness.

The desk-based assessment was undertaken by Arran Ferguson, the walkover survey by Anthony Lee, and the palaeoenvironmental assessment by Denise Druce. The geophysical survey was carried out by GSB Prospection Ltd. Arran Ferguson, Anthony Lee, and Denise Druce wrote the report, which was edited by Alison Plummer. The drawings were produced by Emma Carter and the project was managed by Alison Plummer.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

- 1.1.1 Oxford Archaeology North (OA North) undertook a programme of archaeological assessment, requested by the Chester City Archaeologist, on behalf of United Utilities Ltd, in advance of the proposed route for a new waste water pipeline. The pipeline runs from Ellesmere Port Waste Water Treatment Works SJ 3423 3740 to Mickle Trafford Waste Water Treatment Works SJ 3440 3709 (Fig 1).
- 1.1.2 The work would necessitate the below-ground disturbance of a large area of land, and so the possibility that archaeological deposits would be disturbed during the work was considered to be high. The brief requested a desk-based assessment and walkover survey to include a geophysical investigation and environmental sampling. The study was intended to appraise rapidly the likely archaeological value of the specified area, and to locate and record potentially interesting or important features in the landscape, whether or not they were visible as surface remains.
- 1.1.3 This report sets out the results of the work outlining the findings, followed by a statement of the archaeological potential of the area, an assessment of the impact of the proposed development, and recommendations for further work. Details of the recorded sites are presented in a gazetteer (*Appendix 2*).

2. METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was submitted by OA North (*Appendix 1*), in response to a request from United Utilities Ltd, for an archaeological assessment of the study area, in accordance with a verbal brief from Mike Morris of Chester City Archaeological Service. Following the acceptance of the project design by the Chester City Archaeologist, OA North was commissioned by the client to undertake the work. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute of Field Archaeologists.

2.2 DESK-BASED ASSESSMENT

2.2.1 Several archives were consulted; principally the Cheshire County Record Office in Chester and the SMR also in Chester, as well as OA North's own extensive library and portfolio of previous work within the study area. Only a limited corridor of approximately 1km either side of the easement of the pipeline was examined.

2.2.2 **Sites and Monuments Record (SMR):** the Cheshire Sites and Monuments Record, a database of archaeological sites within the country, maintained by the Cheshire County Council in Chester, was accessed. A brief record including a grid reference and description was obtained for the various sites within the study area. Aerial photographs were examined with reference to the SMR, but failed to identify any new sites.

2.2.3 **County Record Office (Chester):** the County Record Office in Chester was visited primarily to consult any original documents relating to the study area, although there were few with any specific relevance. Historic maps, including early edition Ordnance Survey maps were more useful, especially given the size of the study area. Several secondary sources and archaeological or historical journals were also consulted.

2.2.4 **OA North:** recent archaeological reports, both published and unpublished were also consulted.

2.3 WALKOVER SURVEY

2.3.1 Fieldwalking for the walkover survey was undertaken in the designated fields, in systematic transects. The width of the transects varied dependent upon the conditions in each field but were typically 50m wide. The archaeological features identified were tied into the relevant Ordnance Survey map sheet, and sites identified during the walkover have been included in the gazetteer (*Appendix 2*) and are shown in Figures 2a and 2b.

2.4 PALAEOENVIRONMENTAL ASSESSMENT

- 2.4.1 The gross stratigraphy of the pipeline corridor was recorded in the field using a gouge auger. As the general stratigraphy of the area was broadly similar, cores were initially taken at *c* 200m intervals (rather than 100m intervals as stated in the Project Design), and then more detailed coring was concentrated in areas of most interest, such as across possible palaeochannels. The position of the cores along the proposed pipeline route is shown in *Figure 4*. The stratigraphic data was plotted using the TSPPlus plotting programme (Dyer 1995). It was intended to take palaeoenvironmental assessment material using a Russian-type peat corer; however, this proved difficult given the clayey nature of the sediment in the area. Therefore, the spot samples taken from the gouge auger to confirm sediment description in the laboratory also provided material to assess the preservation of palaeoenvironmental indicators. Though this method is adequate at an assessment stage, further, more reliable sampling, would be required should any aspects of the assessment highlight areas of palaeoenvironmental potential.
- 2.4.2 **Pollen assessment:** the samples were prepared using standard procedures (Faegri and Iverson 1989) and mounted in silicone oil. The pollen slides were examined with a microscope using x400 magnification. Counting continued until a sum of at least 100 land pollen grains was reached. Due to time restriction, only immediately identifiable herbaceous pollen was taken to family level, the rest are listed as herbs. Plant nomenclature follows Stace (1991). The results are quantified in *Tables 3 and 4*.
- 2.4.3 **Macrofossil assessment:** approximately 100ml of sediment from specific spot samples were assessed for plant macrofossils, foraminifera and ostracods. The material was wet sieved using a 63 μ mesh and examined under a binocular microscope to determine the presence/absence of the above indicators.

2.5 GEOPHYSICAL SURVEY

- 2.5.1 The a total of 12ha along a 20m wide corridor of the proposed pipeline route was subjected to a magnetometry scan using Geoscan FM256 fluxgate gradiometers, in order to identify any anomalies that might indicate the presence of archaeological features (Fig 6).
- 2.5.2 With gradiometers in scanning mode, the evaluation area was examined along traverses spaced at intervals of approximately 10m. Any significant fluctuations observed on the instrument display panel were investigated more closely to determine their likely origin. Any anomalies considered to have archaeological potential were marked with canes for detailed recorded survey. This was followed by a 10% sample of detailed recorded survey at four locations along the pipeline route, Areas A, B, C, and D. The survey grid was tied in to existing boundaries.

2.6 GAZETTEER

2.6.1 All of the information concerning archaeological sites in the affected area has been collated into a gazetteer (*Appendix 2*), which provides details of the location and character. Locations are given as eight-figure National Grid References where possible. A summary description of each site is provided in conjunction with a reference to the source of the information (SMR, field survey, cartographic and documentary) with references as appropriate, and an assessment has been given of the interpretation and archaeological potential of the site. The sites have been marked onto a map to illustrate their position (*Figure 2*).

2.7 ARCHIVE

2.7.1 A full professional archive has been compiled in accordance with the project design (*Appendix 2*), and in accordance with current IFA and English Heritage guidelines (English Heritage 1991). The paper and digital archive will be deposited in the Cheshire Record Office, Chester, on completion of the project.

3. BACKGROUND

3.1 LOCATION

- 3.1.1 The pipeline runs for 4km from Mickle Trafford Waste Water Treatment Plant to Ellesmere port Waste Water Treatment Plant, Cheshire. (Fig1). The route runs broadly parallel with the Mill Brook in the Gowy wetland zone.

3.2 GEOLOGY AND TOPOGRAPHY

- 3.2.1 The study area is within a lowland zone. The solid Geology consists of poorly drained glacial and Triassic clays with outcrops of sandstone. This would have been heavily covered in oakland and scrub in prehistoric times with marsh and mixed woodland predominant in the vicinity of the Gowy river (Thompson 1965).
- 3.2.2 The topography is generally that of a gently rolling coastal plain, cut by networks of drainage channels forming angular fields. Typically the land is low lying rising to an average of 16m. There are small pockets of woodland and small field ponds being particularly common (*ibid.*).

3.3 HISTORICAL BACKGROUND

- 3.3.1 **Prehistoric:** this period is not well represented in the study area, or indeed in the North West as a whole, until after 12,000 BC when some scant evidence for the exploitation of the Pennine fringes by seasonal hunters may be detected (Crosby 1996, 15-18; Higham 1993, 15-16). Their territory extended into Cheshire where extensive woodland and meres provided excellent hunting (*ibid.*). After 6,000 BC some sites have been identified within the county proper and recent excavations continue to provide further evidence of settlement from the late Neolithic onwards. The dearth of prehistoric sites may be as much to do with the concentration of research on Roman military and civilian activity in Cheshire as it is to do with the actual lack of such sites.
- 3.3.2 Recent excavations resulting from commercial demands have established the presence of settlement sites dating from the late Neolithic onwards. A single flint core recovered from excavations at Birch Heath, Tarporley have been attributed to the late Neolithic/Bronze Age, but was not associated with any features (Fairburn 2002a, 73). Excavations at Tatton Mere have identified late Neolithic settlement (Crosby 1996, 16). At about this time (4500-2000 BC) farming has been evidenced at Ashton near Tarton by plough marks and general woodland clearance across the county (*op cit* 17). Paelaeobotanical studies from lakes and bogs attest not only to woodland clearance, but also to the growing of cereal crops as at Hatchmere and Delamere Forest (*ibid.*). A re-evaluation of pottery and flints found at Beeston Castle, Norton Village and Abbey Green has identified Grimstone Ware, an early Neolithic pottery and flint assemblages that are generally attributed to the early fourth millennium (Mullin 2002, 6). Lithics were represented by leaf-shaped arrowheads and axe head fragments (*ibid.*), typical of the early Neolithic. A possible Neolithic long

mortuary enclosure, identified by aerial survey, was found at Churton in the nearby Dee valley (Longley 1987, 47) establishing a monumental presence

- 3.3.3 The Early and Middle Bronze periods are better represented than earlier periods, perhaps due to the amelioration in climatic conditions. After 2500 BC warmer, drier weather extended arable cultivation into higher altitudes. By 1500 BC arable cultivation of upland Cheshire was possibly greater than any other period (*ibid*). A general deterioration of the climate occurred after 1500 BC. This climatic deterioration may also explain the trend towards the construction of defensive monuments in the late Bronze Age and early Iron Age, in particular the hillfort. Beeston Castle, Eddisbury, Kelsborrow and Maiden Castle, Bickerton located on the Mid-Cheshire ridge imply a societal focus for the area which continued through to the early Iron Age (Fairburn *et al* 2002b, 47). Excavations at Brook House Farm, Bruen Stapleford, in advance of a linear scheme identified evidence of occupation from the early Bronze Age through to the Late Iron Age (*op cit*, 25). At least one structure would appear to date from the middle to late Bronze Age (Structure 5 phase 1) based on diagnostic pottery and associated radiocarbon dates located in the ring gully (*ibid*). Two further structures are attributed to the late Bronze Age/early Iron Age, again based on radiocarbon dates and a further five structures show the site was continually occupied until the Roman conquest, and again in the medieval period (*op cit*, 28). The site is of regional importance not least for indicating the possible location of rural sites away from the hillforts of the Cheshire ridge.
- 3.3.4 **Roman:** the Roman period is well represented and well documented in Cheshire with Chester as the focal point. By AD 71 a Roman military force sufficient enough to support two major campaigns was already installed in Chester (Crosby 1996, 20). These campaigns, directed against the Brigantes and the remaining Welsh resistance, made Chester an ideal location for a base of operations, lying, as it does, close to the north Welsh territories, reasonably near the Pennines, with the estuary suitable for a base from which all the north-west of England could be accessed. By AD 74 the Romans had subdued the local tribes, including the Cornovii of Cheshire and Shropshire and it can be safely assumed that a fort had been established in Chester by this time. Suggestions that an earlier pre-Flavian fort existed by AD 60 are currently insufficiently substantiated, based primarily on the recovery of Roman ceramics that support this early date. What is certain is that After AD 100 the fort at Chester had been substantially rebuilt on the north bank of the river Dee with stone walls and a new ditch system (*ibid*). A number of civilian settlements grew around Chester, which had by now become a thriving commercial as well as military centre, including Herronbridge, Saltney and Holt, the workshops of the latter producing the vast majority of the Chester garrison's pottery needs. More recently a fortlet has been identified at Ince, to the north east of the study area, dating to the end of the 2nd century AD (*op cit*, 23).
- 3.3.5 Villas are not well represented with only one known example at Eaton by Tarporley with, perhaps, villa-like buildings at Tattenhall and Crewe Hall. What is clear is that Cheshire, being on the fringes of the Roman empire, both

geographically and economically, retained a great deal of the pre-Roman attributes in terms of rural settlement, farming systems and dwelling styles as evidenced by aerial surveys (*op cit* 27). The sparse evidence for rural Roman-British settlements in Cheshire is changing with the discovery of new sites almost annually. The unexpected discovery of a small settlement at Birch Heath, Tarporley, in advance of a pipeline, to the south-east of the study area, gives some inkling of the potential for further sites to be identified during pre-construction ground works as the site had not been picked up by either aerial or geophysical survey (Fairburn *et al* 2002a, 103).

3.3.6 **Medieval:** the early medieval period in the county is not well represented, though recent excavations and survey work point to social continuity rather than complete disintegration after the withdrawal of Roman troops. Evidence for this comes from the continued prosperity of Chester (Beresford 1979, 189), referred to by Bede as a *civitas*, and the place-name evidence for towns ending in *wich*, a derivative of the Saxon word *wic*, meaning ‘trading settlement’, and an indication that salt was still being exploited after the Roman period. The location of the Saxon chapel at Stoak (Site 2) is the closest known site of this period within the study area. Within the churchyard of the present church in Stoke is the remains of a medieval standing cross (Site 3), which along with the Mill at Wimbolds Trafford (Site 4), comprise the only known medieval sites in the study area, the exact location of the latter being unknown.

3.3.7 **Post-Medieval:** by the middle of the 16th century dairy farming in Cheshire had become the predominant farming practice, particularly in the northern part of the county, with up to 60% of the value of larger estates being invested in livestock and 30% in grain crops (Crosby 1996, 62). The county as a whole was becoming more reliant on the commercial cheese trade, specifically to the larger industrialised towns in the later post-medieval period, such as Manchester, Liverpool and parts of Cheshire itself. The upland areas were reliant upon cattle to a lesser extent and the production of Cheshire wool for the textile industry in south Lancashire continued until the mid-18th century (*ibid*). The borough monopolies that had controlled the salt industries in the old *wich* towns had, by the late 17th century been broken up allowing a large number of competing companies access to the salt networks and creating intense price competition (Newman 2001, 207). The discovery of rock salt in 1670 near Northwich saw the emergence of a mining industry and fuelled further price competition. Contemporaneously, transport methods were becoming more efficient with the opening of the Ellesmere Port Canal in 1795, later to become part of the Shropshire Union Canal, which connected the Severn and the Mersey rivers (Roberts 1995). Methods of transport were further improved with canals cut through the saltfields allowing for both the export of salt and rock salt for refining and the import of coal for the boiling process (*ibid*). The transport system improved steadily through to the 19th century with the construction of the railways and by the end of the century brine was pumped from Cheshire to the Mersey by pipeline.

4. DESK-BASED ASSESSMENT RESULTS

4.1 INTRODUCTION

4.1.1 The SMR identifies 20 Sites within 1km of the proposed pipeline, none of which will be directly affected by the associated ground works. The majority of these sites relate to Roman find spots and indicate a high potential for further artefacts and/or sites of this period to be located during the course of groundworks associated with the development. Cartographic and documentary sources failed to identify any further sites within the corridor of the pipeline (Fig 3).

4.2 ASSESSMENT RESULTS

4.2.1 Only one scheduled monument is within the study area, the standing cross (Site 3) in the churchyard of St Lawrence's church in Stoak. This is a Listed Grade II monument. The village of Stoak would not be affected by the proposed development.

4.2.2 The remaining sites recorded by the SMR are a mix of period and type. The Roman period is better represented than the others, which is perhaps not surprising given the study area's proximity to Chester. The SMR identifies fourteen Roman sites (**5-8, 10-14, 16-20**), of which eleven are find spots, **18** relates to the possible Roman road in Mickle Trafford and sites **19** and **20** refer to the Chester to Wilderspool Roman road. No prehistoric sites were identified. Three medieval sites were identified, including a church, a cross in the churchyard, a watermill and a possible medieval find of a rotary quern. A second watermill was identified that could either be medieval or post-medieval and farmhouse was identified as being post-medieval. None of these sites was directly affected by the pipeline.

Table 1: Identified Sites

| <i>Period</i> | <i>Type</i> | <i>Site Number</i> |
|---------------|-------------|--------------------|
| Roman | Find spot | 5 |
| Roman | Find spot | 6 |
| Roman | Find spot | 7 |
| Roman | Find spot | 8 |
| Roman | Find spot | 10 |
| Roman | Find spot | 11 |
| Roman | Find spot | 12 |

| <i>Period</i> | <i>Type</i> | <i>Site Number</i> |
|------------------------|-------------|--------------------|
| Roman | Find spot | 13 |
| Roman | Find spot | 14 |
| Roman | Find spot | 16 |
| Roman | Find spot | 17 |
| Roman | Road | 18 |
| Roman | Road/ditch | 19 |
| Roman | Road | 20 |
| Medieval | Church | 2 |
| Medieval | Cross | 3 |
| Medieval | Watermill | 4 |
| Medieval? | Find spot | 9 |
| Medieval/post-medieval | Watermill | 15 |
| Post-medieval | Farmhouse | 1 |

5. WALKOVER SURVEY RESULTS

5.1 INTRODUCTION

- 5.1.1 The walkover field survey was undertaken along the proposed route of the pipeline, encompassing an area 100m each side of the projected easement. The main aim of the fieldwork was to identify rapidly and record the existence, location and extent of any previously unrecorded sites; in total seven further sites were identified, two of these, **23** and **27**, lying directly on the pipeline, and two more, **21** and **22**, lying in an area that will potentially be subjected to truncation (Fig 2).
- 5.1.2 The fields were typically gently sloping, featureless improved pasture with short cropped grass. The field pattern was regular and often defined by degraded hedgerows, with several field boundaries observed on recent maps having been completely obliterated.

5.2 IDENTIFIED SITES

- 5.2.1 Site **21** was an existing trackway that was not recorded on current maps. It ran from Mason's Bridge parallel to the Shropshire Union Canal for approximately 100m in a north/south direction before turning eastward and continuing on an east/west alignment for at least 200m. Its width was typically 3.5m and frequent modern hardcore rubble was observed where the grass cover was not total (Plate 1).
- 5.2.2 Site **22** was a disused trackway, situated between two fields, with hedgerow creating its edges. The feature ran east/west and crossed the canal at Meadow Lane Bridge. The trackway was 8m wide and overgrown with untended hedgerow and bramble.
- 5.2.3 Site **23** was represented by a shallow depression in an otherwise flat, gently sloping field. The hollow was approximately 15m in diameter and 1m deep and was likely to have been the site of a field pond.
- 5.2.4 Site **24** was a low mound approximately 10m in diameter and 1m high, situated adjacent to the canal. Several molehills were inspected which revealed no evidence of any heat-affected stones, suggesting that this feature was unlikely to have been a prehistoric burnt mound. It was possibly created by upcast material during the creation of the canal.
- 5.2.5 Site **25** was represented by a possible former field pond. The feature had an approximate diameter of 30m and a depth of 0.8m.
- 5.2.6 Site **26** comprised two adjacent water-filled hollows, which were possibly degraded field ponds. Both had an approximate diameter of 30m and a depth of 1.5m (Plate 2).
- 5.2.7 Site **27** was another overgrown trackway running east/west for 200m and approximately 8m wide. The overgrown feature was bounded on the north side

by an hedgerow with the southern edge comprising a barely visible low bank. Two machine-cut timber posts, 1.6m high, survived on the line of the bank and were situated approximately 150m apart (*Plate 3*).

Table 2: Sites Identified from Walkover Survey

| <i>Period</i> | <i>Type</i> | <i>Site Number</i> |
|------------------------|-------------|--------------------|
| Medieval/post-medieval | Field pond | 23 |
| Medieval/post medieval | Field pond | 25 |
| Medieval/post-medieval | Field ponds | 26 |
| Post-medieval | Trackway | 21 |
| Post-medieval | Trackway | 22 |
| Post-medieval | Mound | 24 |
| Post-medieval | Trackway | 27 |

6. PALAEOENVIRONMENTAL ASSESSMENT RESULTS

6.1 INTRODUCTION

6.1.1 The palaeoenvironmental assessment included the survey of the gross stratigraphy of the pipeline corridor using a gouge auger at *c* 200m intervals (Fig 4). A total of 23 core samples were taken, at 20 locations, to a maximum depth of 2.1m, although the majority were *c* 1m in depth. Following this, more detailed coring was concentrated in areas of most interest, such as across possible palaeochannels. The stratigraphy was recorded in the field and spot samples were taken in order to confirm sediment description in the laboratory and to assess the preservation of palaeoenvironmental indicators.

6.2 RESULTS

6.2.1 ***The Stratigraphic survey:*** the general stratigraphy of the pipeline route consists of *c* 0.10-0.30m of sandy soil overlying stiff red clay (boulder clay) (Fig 5a and 5b). The depth of most of the cores was determined by the depth to which the gouge auger could penetrate; however, stiff red clay, which is assumed to be the underlying drift geology, was penetrated to some degree in all of the cores except for where they coincided with the courses of two possible palaeochannels. These were identified where the cores reached a greater depth and the sandy soil overlaid alluvial or fluvial clay deposits (core 6b, 7a and 16). Core 6b also appeared to contain a relatively organic-rich layer at *c* 0.50m depth (brown clay soil) that could represent a period of former soil development. Core 7b, *c* 100m south of core 7a, appeared to represent some form of sand bank situated on the edge of the channel.

6.2.2 ***Pollen assessment:*** four pollen samples were selected from each of the two palaeochannels, the results of which are shown in Tables 3 and 4.

6.2.3 ***Palaeochannel (core sample 7a):*** a count of at least 100 land pollen grains was achieved in all four samples from the palaeochannel (Table 3). The number of tree and shrub pollen is highest in the lowermost sample at 0.45m from the modern ground surface (Sample 16), but the numbers decline significantly up the profile. Simultaneous to this decline in tree and shrub pollen are a rise in herbaceous species, Poaceae (grass) and an increased occurrence in *Cerealia* (cereal-type) pollen. The pattern, in general appears to signify landscape clearance with increased cereal cultivation. The higher levels of *Alnus* (alder) pollen and the possible presence of the aquatic *Sparganium* (bur-reeds) pollen in the lower two samples may indicate wetter conditions earlier on. A more detailed study would determine landscape change in the area in relation to clearance/farming activity.

Table 3: Pollen counts from Palaeochannel (core sample 7a) (+ = present)

| Sample no | | 13 | 14 | 15 | 16 |
|------------------------------|--------------------------|------------|-----------|------------|------------|
| Sample depth m | | 0.17 | 0.23 | 0.35 | 0.45 |
| Tree & Shrub | | | | | |
| <i>Quercus</i> | Oak | - | 7 | 4 | 2 |
| <i>Alnus</i> | Alder | 2 | 3 | 5 | 51 |
| <i>Betula</i> | Birch | - | - | 2 | - |
| <i>Corylus</i> | Hazel | 4 | 9 | 11 | 31 |
| <i>Ilex</i> | Holly | - | 1 | - | - |
| <i>Calluna</i> | Heather | 1 | 2 | 1 | |
| | Total | 7 | 22 | 23 | 84 |
| Herbs | | | | | |
| Herbs indet. | | 45 | 27 | 14 | 1 |
| Poaceae | Grass family | 19 | 9 | 24 | 13 |
| <i>Cerealia</i> | Cereal-type | 11 | 4 | 3 | 2 |
| Cyperaceae | Sedge family | 3 | 14 | 15 | 3 |
| Asteraceae | Daisy family | 4 | 2 | 3 | - |
| <i>Plantago</i> sp. | Plantains | - | - | 3 | 2 |
| Caryophyllaceae | Pink family | - | 1 | 1 | - |
| <i>Ranunculus</i> sp. | Buttercups | - | 3 | 2 | - |
| Chenopodiaceae | Goosefoot family | 1 | - | - | - |
| | Total | 83 | 50 | 65 | 21 |
| Aquatics & spores | | | | | |
| <i>Sparganium?</i> | Bur-reeds | - | - | 2 | 1 |
| Fern spores | | - | 8 | 4 | 4 |
| <i>Sphagnum</i> spores | | - | - | - | 1 |
| Crumpled/degraded | | 10 | 16 | 18 | 16 |
| Unknown | | - | 2 | - | - |
| Charcoal | | + | - | - | - |
| | Total Land Pollen | 100 | 90 | 106 | 121 |

6.2.4 **Palaeochannel (core sample 16):** the top three samples from the palaeochannel (core sample 16) (Table 4) contained abundant pollen grains, and were dominated by Poaceae and herbaceous species, including Asteraceae (daisy family), *Plantago* sp. (plantains), and Chenopodiaceae (goosefoot family). Some tree and shrub pollen was present, and this consisted mostly of *Alnus* and *Corylus* (hazel). The landscape during the infilling of the top 0.50m of this palaeochannel, therefore, appears to be open with evidence of some arable and possible pastoral activity. The fourth sample (sample 40), taken at c 1.70m depth was very different, although pollen preservation was much poorer. *Alnus* pollen dominated this sample, with limited herbaceous pollen and some *Tilia* (lime) pollen. The dominance of these two taxa, however, which are easily identifiable even when degraded, suggests that the pollen assemblage at this level may be altered by differential preservation. Like the evidence from the palaeochannel (core sample 7a), the lower sediments contain pollen indicative of a landscape with more scrub/woodland vegetation. A more detailed study would elucidate the nature and timing of clearance and farming activity in the area.

Table 4: Pollen counts from Palaeochannel 16 (+ = present)

| Sample no | | 38 | 39 | 40 |
|------------------------------|--------------------------|------------|------------|------------|
| Sample depth m | | 0.15 | 0.35 | 0.47 |
| Trees & Shrubs | | | | |
| <i>Quercus</i> | Oak | - | - | 2 |
| <i>Alnus</i> | Alder | 3 | 19 | 7 |
| <i>Betula</i> | Birch | - | 2 | 1 |
| <i>Corylus</i> | Hazel | 3 | 3 | 8 |
| <i>Calluna</i> | Heather | - | 1 | 4 |
| | Total | | | |
| Herbs | | | | |
| Herbs indet. | | 7 | 10 | 13 |
| Poaceae | Grass family | 43 | 36 | 35 |
| <i>Cereal</i> | Cereal-type | 1 | 1 | - |
| Cyperaceae | Sedge family | 3 | 2 | 3 |
| Asteraceae | Daisy family | 14 | 12 | 14 |
| <i>Plantago</i> sp. | Plantains | 2 | 4 | 1 |
| Caryophyllaceae | Pink family | - | - | 1 |
| <i>Ranunculus</i> sp. | Buttercups | - | 1 | 1 |
| Chenopodiaceae | Goosefoot family | 2 | 2 | - |
| | Total | | | |
| Aquatics & spores | | | | |
| <i>Typha latifolia</i> | Bulrush | - | 1 | - |
| Fern spores | | 2 | 3 | 1 |
| | | | | |
| Crumpled/degraded | | 21 | 9 | 19 |
| Unknown | | 1 | - | 1 |
| Charcoal | | + | + | + |
| | | | | |
| | Total Land Pollen | 100 | 102 | 110 |

In order to provide a chronological framework for our understanding of these landscape changes it is important that any sediment profiles analysed for pollen are dated.

6.2.5 *Assessment of plant macrofossils, foraminifera and ostracods:* one or two *Juncus* sp. (rush family) seeds were present in Samples 13, 14 and 15 from palaeochannel (core sample 7a), however, ostracods and foraminifera appear to be absent from all of the samples. No further work on these palaeoenvironmental indicators is warranted on the palaeochannel sediments.

7. GEOPHYSICAL SURVEY RESULTS

7.1 INTRODUCTION

7.1.1 Full results of the geophysical survey may be found in a separate report (GSB Prospection Ltd, 2004). What follows is a brief summary of those results.

7.2 RESULTS OF SCANNING

7.2.1 A generally low level of magnetic response was observed throughout the length of the proposed pipeline route. In some places anomalies produced by existing service pipes were encountered. Due to the occurrence within them of anomalies or fluctuating responses of possible archaeological potential, four areas along the proposed pipeline route, representing 10% of the total area, were subjected to targeted detailed survey (Areas A-D) (Fig 6). Only Area D was considered to be of potential archaeological interest, following detailed survey.

7.3 RESULTS OF DETAILED SURVEY

7.3.1 **Area A:** a very large ferrous object, probably a pipe lying to the north of the survey area produced a large response that dominated the results. Several linear trends were recorded within the southern part of survey Area A. Recent agricultural disturbance or past ploughing is likely to account for these anomalies.

7.3.2 **Area B:** the southern part of the survey Area B could be seen to be magnetically disturbed due to a spread of ferrous material as suggested by the scan. There were a number of linear responses and trends in the data that may be of archaeological interest, some of which possibly relate to an enclosure underlying a spread of modern debris. An alternative and more likely explanation is that these anomalies relate to landscaping and/or modern ploughing disturbance of material associated with the construction of the M56 motorway and adjacent flyover.

7.3.3 **Area C:** a series of trends aligned approximately north/south were recorded in this survey block. They were parallel to each other and are thought to be due to ploughing, past ridge and furrow cultivation of the field or the presence of drainage pipes. A single, short, ditch-type response was indicated on the interpretation. Given the alignment and insubstantial nature of the anomaly, however, it is also likely to be the result of ploughing or a field drain.

7.3.4 **Area D:** a region of increased magnetic response was recorded in the northern half of the survey area. Two possible pit-type anomalies and several trends were apparent within it, suggesting that a small area of occupation activity might be present. However, it should be noted that a spread of modern debris and/or soil disturbance could have produced these anomalies and no clear archaeological pattern was present in the data.

8. IMPACT AND RECOMMENDATIONS

8.1 THE DEVELOPMENT AREA

- 8.1.1 All of the sites identified by the SMR are outside the proposed route of the pipeline and will not be adversely affected by the development. Of the 20 sites identified by this assessment, 12 are find spots near the proposed development and illustrate clearly the potential for further stray finds being present within the development area.
- 8.1.2 Recent archaeological investigations in the county have highlighted the potential for hitherto unexpected sites being present in the landscape and the archaeological survey may have been biased towards the identification of remains from later periods. It is highly likely that further pre-construction archaeological evaluation could identify sub-surface features, deposits or artefacts of significance.
- 8.1.3 The walkover survey identified several former field ponds, one of which (Site **23**) lies very close to the line of the proposed pipeline route and may be truncated. A mound, **24**, and two other ponds, **25** and **26**, are on the periphery of the corridor, but, if possible, care should be taken to avoid their disturbance. Three degraded trackways (Sites **21**, **22** and **27**) will be truncated at the points where they will be crossed by the pipeline.
- 8.1.4 The proposed pipeline will cut two palaeochannels that contain pollen-rich sediments that have the potential to inform our understanding of the character of the historic local environment and how this developed over time.
- 8.1.5 The geophysical survey identified a group of possible archaeological anomalies that will be disturbed by the ground works within survey Area D, near the southern end of the proposed pipeline.

8.2 RECOMMENDATIONS

- 8.2.1 The route of the pipeline does not impact upon any known archaeological sites highlighted by the desk-based assessment; however, this area was not covered in the North West Wetlands Survey (Leah and Wells 1997) and as far as the author is aware, up until now, very little is known about its landscape history.
- 8.2.2 The information from any sites revealed along the pipeline will contribute to our understanding of the landscape history of the region in relation to wood/scrubland clearance and farming/settlement activity. It is important to gain an understanding of exactly when this first occurred, how land use patterns altered through time and how the area in the immediate vicinity of the development might have interrelated with surrounding areas, including urban centres such as Chester.
- 8.2.3 With the exception of the sites detailed in *Sections 8.1.3 – 8.1.5* above, the archaeological survey failed to identify significant areas of archaeological sensitivity; however, the size of the development area, the nature of recent

land use and the frequent number of known find spots in its vicinity suggest that further sub-surface features, deposits or artefacts of significance are likely to be revealed in the course of ground working along the route of the pipeline. It is, therefore, recommended that a comprehensive programme of archaeological trenched evaluation over the development area is undertaken well in advance of future works: -

- i) to better define potential areas of archaeological sensitivity;
- ii) to target archaeological remains identified during the survey, with a view to mitigating these prior to ground works commencing.

- 8.2.4 A programme of archaeological evaluation is considered preferable to a permanent presence watching brief, and would help alleviate the risk of delays to the construction programme arising from unanticipated archaeological finds, although a combination of both evaluation and watching brief may be required.
- 8.2.5 The archaeological survey identified several areas (*Sections 8.1.3 – 8.1.5* above) that could be targeted during any future programme of evaluation, with a view to assessing them and potentially mitigating the development impact at an early stage.
- 8.2.6 If the former field pond (Site **23**), identified during the walkover survey and not shown on any of the early maps, is to be affected by the development, then it is recommended that a topographic survey, and a programme of environmental sampling/assessment is undertaken for pollen, plant macrofossils, ostracods and material for dating.
- 8.2.7 Careful positioning of the evaluation trenches would enable closer examination of the former trackways (Sites **21**, **22** and **27**), enabling the determination of the original dimensions and form of these features. If a watching brief is preferred then these features could be recorded by an archaeologist during the topsoil strip.
- 8.2.8 Following the results of the palaeoenvironmental assessment, a programme of on site environmental sampling for pollen is recommended for the two palaeochannels identified by the auger survey. Organic-rich material should be sought for the purpose of dating the sequences. Whether a watching brief or evaluation is preferred, further characterisation of the fluvial/alluvial sequences within the palaeochannels (in order to most effectively locate additional monolith samples for pollen and to retrieve datable material from any associated organic-rich deposits) would require the excavation and recording of trenches lateral to the channels, across their total width, and at a sufficient depth to reveal the complete sequence of litho-stratigraphic deposits.
- 8.2.9 It would be prudent to further characterise the anomalies identified by the geophysical survey in Area D by the targeted positioning of evaluation trenches.

8.2.10 In addition to targeting these known areas of archaeology, it will be necessary to curtail the effects of any ground works within the easement upon mound **24** and field ponds **25** and **26**, or they too will need to be investigated and recorded under archaeological conditions.

8.2.11 A comprehensive programme of evaluation trenching, with a contingency allowing for the investigation of any important discoveries made during the course of the evaluation, or a permanent presence watching brief over the entire route of the pipeline, will be required to mitigate the impact of the development on any archaeological remains inadvertently undetected by the survey.

Table 5: Impact and Recommendations

| <i>Site number</i> | <i>Impact</i> | <i>Recommendations</i> |
|-----------------------------------|---------------------|-----------------------------------|
| 21 | Truncation | Evaluation |
| 22 | Truncation | Evaluation |
| 23 | Truncation | Environmental sampling |
| 24 | Possible truncation | Avoidance |
| 25 | Possible truncation | Avoidance |
| 26 | Possible truncation | Avoidance |
| 27 | Truncation | Evaluation |
| Palaeochannel (core 6b/7a) | Truncation | Evaluation/environmental sampling |
| Palaeochannel (core 16) | Truncation | Evaluation/environmental sampling |
| Area D | Truncation | Evaluation |

9. BIBLIOGRAPHY

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ILLUSTRATIONS

LIST OF FIGURES

Figure 1: Location map showing route of proposed pipeline

Figure 2: Gazetteer sites

Figure 3: OS 1st edition showing the proposed pipeline route

Figure 4: Proposed pipeline route showing position of cores and palaeochannels

Figure 5a: Soil Stratigraphy of the proposed pipeline route, cores 1-8

Figure 5b: Soil Stratigraphy of the proposed pipeline route, cores 8-20

Figure 6: Location map displaying sites of detailed geophysical survey

LIST OF PLATES

Plate 1: Site **21**, trackway, looking north-east

Plate 2: Site **26**, possible former field ponds, looking west

Plate 3: Site **27**, disused trackway, looking south-west

Plate 4: General site shot taken from Dension's Bridge, looking south-east

APPENDIX 1: PROJECT DESIGN

APPENDIX 2: SITE GAZETTEER

Site name Stoak Farmhouse
Site number 01
NGR SJ 4217 7329
SMR No 1996/2
Site type Farmhouse
Period Post-Medieval
Source SMR; List of Buildings of Special Archaeological and Historical Interest

Description

Rendered brick two-storey building with slate roofs, altered in the 17th century. Left-hand wing has ground floor small-paned iron casements, first floor metal casements. Stop chamfered beams, ledge-and-batten doors of three boards and a parlour inglenook are extant in the interior.

Assessment

The site lies to the west of the pipeline route, and is unlikely to be directly affected.

Site name Church of St Lawrence
Site number 02
NGR SJ 4235 7330
SMR No 1996/1/1
Site type Church
Period Medieval
Source SMR, Richards, 1947

Description

The church is located on the site of an earlier Saxon Chapel and contained evidence of 12th century architecture until rebuilding in 1827, including an enriched south doorway, a plain blocked-up north doorway and a carved font. The present building is almost entirely of modern (1827) construction. The interior contains a Tudor hammerbeam roof, 16th century rood screen and a 17th century altar, pulpit and wall tablets.

Assessment

The site lies some distance to the west of the pipeline route, and is unlikely to be directly affected.

Site name Standing Cross in St Lawrence's Churchyard
Site number 03
NGR SJ 4235 7327
SMR No 1996/1/2
Site type Standing Cross
Period Medieval
Source SMR, Richards, 1947

Description

Medieval standing cross broken off half way up the shaft. The base of the cross is made of a single sandstone block measuring 0.72m wide by 0.2m high above the turf. The shaft sits in a square shaft 0.35m wide and becomes octagonal through darts in the corners and rises to a height of 1.25m. A sundial has been secured to this shaft in modern times and it has incurred slight damage in the mounting of two plaques.

Assessment

The site lies some distance to the west of the pipeline route, and will not be directly affected.

Site name Mill at Wimbolds Trafford
Site number 04
NGR SJ 4400 7200
SMR No 2004/1
Site type Watermill and mill complex
Period Medieval
Source SMR

Description

Identified by early place name 'le Mulnemor' meaning marsh at the mill. Location is unknown.

Assessment

The uncertain location of the site means that it is difficult to assess the likely impact of the development.

Site name Roman find spot in Wimbolds Trafford
Site number 05
NGR SJ 4457 7175
SMR No 2053
Site type Find spot
Period Roman
Source SMR

Description

Bronze statuette of Jupiter with inlaid silver eyes. It stands 62.5mm high and is in poor condition with both legs terminating below the knees and the right arm lost below the elbow. The object was found in a field near Ellesmere Port.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be directly affected.

Site name Find spot on banks of the river Gowy, Bridge Trafford
Site number 06
NGR SJ 4450 7130
SMR No 2003
Site type Find spot
Period Post-Medieval
Source SMR

Description

A George the Third Irish penny dated 1806/7 and two lead weights marked VIII. Found on the left bank of the river Gowy about 35m from the new weir.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be directly affected.

Site name Roman find spot in Mickle Trafford Parish
Site number 07
NGR SJ 4483 7110
SMR No 2341/0/4
Site type Find spot
Period Roman
Source SMR

Description

Bronze coin of Constantine (AD 306-337). Minted in London AD 319-320.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be affected.

Site name Roman find spot in Mickle Trafford Parish
Site number 08
NGR SJ 4476 7111
SMR No 2341/0/1
Site type Find spot
Period Roman
Source SMR

Description

Bronze sestertius of Antonius Pius (AD 138-161). No accurate location of find spot.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be directly affected.

Site name Find spot on the banks of the river Gowy
Site number 09
NGR SJ 4476 7113
SMR No 2000
Site type Find spot
Period Medieval ?
Source SMR; OS record card SJ47SW8/1959

Description

Upper stone of a rotary stone quern. Possibly medieval. Found on the north bank of the river Gowy. Seems to have formed part of a stone revetment along with other stones.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be directly affected.

Site name Find spot at Mickle Trafford Parish
Site number 10
NGR SJ 4483 7111
SMR No 2341/0/5
Site type Roman find spot
Period Roman
Source SMR

Description

Bronze coin of House of Constantine. Minted in Trier AD 321. Found and reported to the museum in 1986.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be directly affected.

Site name Post-medieval coin hoard from Bridge Trafford
Site number 11
NGR SJ 4494 7129
SMR No 2001
Site type Find spot
Period Post-medieval
Source SMR, OS record card SJ47 SW4/1959

Description

An Elizabethan silver coin hoard found in 1895 under a doorstep to a cottage. The coins ranged in date from 1559-1594 and were contained in either a small earthenware jug or a silver cup, depending upon conflicting accounts of the hoards provenance.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be directly affected.

Site name Find spot on the banks of the river Gowy
Site number 12
NGR SJ 4450 7130
SMR No 2002/0/1
Site type Find spot
Period Roman
Source SMR

Description

A very worn sestertius of Hadrian (AD 117-138) found on the left bank of the Gowy river 35m below the new weir.

Assessment

The site lies some distance to the east of the pipeline route, and is unlikely to be directly affected.

Site name Roman find spot from Bridge Trafford Parish
Site number 13
NGR SJ 4460 7140
SMR No 2002/0/2
Site type Find spot
Period Roman
Source SMR

Description

Sestertius of Marcus Aurelius (AD 161-180) in good condition. Also found was a fibula, Collingwood type R (ii). The bow of the brooch has been bent in antiquity. The pin and suspension loop are complete and undamaged.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be directly affected.

Site name Roman find spot from Mickle Trafford Parish
Site number 14
NGR SJ 4484 7109
SMR No 2341/0/6
Site type Find spot
Period Roman
Source SMR

Description

Bronze sestertius of Marcus Aurelius (AD 161-180), minted in Rome AD 166. Found and reported to Grosvenor Museum in 1986.

Assessment

The site lies some distance to the east of the pipeline route, and is unlikely to be affected.

Site name Trafford Mill
Site number 15
NGR SJ 4501 7082
SMR No 1989/1
Site type Watermill and mill complex
Period Medieval/ post-medieval
Source SMR

Description

First recorded in AD 1304 the current buildings are Georgian and contain two undershot waterwheels. The original mill is extant only as a sub-surface feature.

Assessment

The site lies east of the pipeline route, and it is unlikely to be affected.

Site name Prehistoric find spot in Mickle Trafford Parish
Site number 16
NGR SJ 4478 7111
SMR No 2341/0/2
Site type Find spot
Period Roman
Source SMR

Description

Bronze nail cleaner (1st – 2nd century date) 41.5 mm long with the tip missing. Found in fields near footpath.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be directly affected.

Site name Roman coin from Mickle Trafford
Site number 17
NGR SJ 4481 7110
SMR No 2341/0/3
Site type Find spot
Period Roman
Source SMR

Description

Bronze sestertius of Trajan (AD 98-117) minted in AD 103 and found in 1986.

Assessment

The site lies to the east of the pipeline route, and is unlikely to be directly affected.

Site name Possible Roman road in Mickle Trafford
Site number 18
NGR SJ 4440 7014
SMR No 2355
Site type Roman road
Period Roman
Source SMR

Description

Possible Roman road, cobbled and set in clay. The road is between 7-9 m wide bounded by V-shaped ditches.

Assessment

The site lies to the south of the pipeline route, and is unlikely to be directly affected.

Site name Roman road- Chester to Wilderspool
Site number 19
NGR SJ 4409 7006
SMR No 2417/1/1
Site type Road/Embanked ditch
Period Roman
Source SMR

Description

Located by test trench in 1994, excavation revealed a cambered agger with metallised surface. Shallow ditch on south side, with the north side destroyed by modern disturbance.

Assessment

The site lies to the south of the pipeline route, and is unlikely to be directly affected.

Site name Roman road- Chester to Wilderspool
Site number 20
NGR SJ 5093 7657
SMR No 2417/1/0
Site type Roman road
Period Roman
Source SMR

Description

Road traced north-east from Chester to connect with the northern road through Warrington at the Roman settlement at Wilderspool. Traces of the road have been identified at the junction of Birkenhead road and Parkside road in Chester.

Assessment

The site lies some distance to the south of the pipeline route, and is unlikely to be directly affected.

Site name South-west of Mason's Bridge
Site number 21
NGR SJ 342350 374001
SMR No -
Site type Trackway
Period Post-medieval
Source Walkover Survey

Description

Grassed over trackway not represented on current mapping. The road is approximately 3.5 m wide and frequent rubble hardcore was observed where the grass cover was not complete.

Assessment

The site crosses the pipeline route and is likely to be affected.

Site name Trackway leading east from Meadow Lane Bridge
Site number 22
NGR SJ 342474 373958
SMR No -
Site type Disused trackway
Period Post-medieval
Source Walkover survey

Description

Disused trackway aligned north-east/south-west situated between two hedgerow boundaries.

Assessment

The site crosses the pipeline route and is likely to be affected.

Site name South-east of Meadow Lane Bridge
Site number 23
NGR SJ 342377 373861
SMR No -
Site type Former field pond
Period Medieval/post-medieval
Source Walkover survey

Description

Possible former field pond represented by a shallow, slightly wet circular depression.

Assessment

The site lies close to the pipeline route and may be affected.

Site name North-east of Stoke Bridge
Site number 24
NGR SJ 342574 373155
SMR No -
Site type Mound
Period Post-medieval
Source Walkover Survey

Description

Low, circular mound situated adjacent to the canal. Possibly derived from upcast material created during the construction of the canal.

Assessment

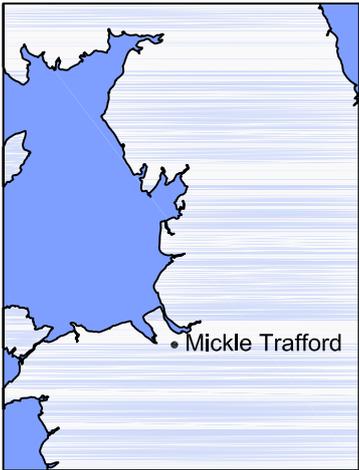
The site lies to the south-west of the pipeline route and is unlikely to be affected.

Site name South of the M56 motorway, east of Picton Lane
Site number 25
NGR SJ 342975 372773
SMR No -

Site type Possible former field pond
Period Medieval/post-medieval
Source Walkover survey
Description
Possible former field pond represented by a shallow, slightly wet circular depression.
Assessment
The site lies to the east of the pipeline route and is unlikely to be affected.

Site name North-east of Ashwood House Farm
Site number 26
NGR SJ 342927 372652
SMR No -
Site type Possible former field ponds
Period Medieval/post-medieval
Source Walkover survey
Description
Possible former field ponds represented by two adjacent sub-circular water-filled hollows.
Assessment
The site lies to the south-west of the pipeline route and is unlikely to be affected.

Site name North-east of New House Farm
Site number 27
NGR SJ 344003 370980
SMR No -
Site type Disused trackway
Period Post-medieval
Source Walkover survey
Description
Disused trackway aligned north-east/south-west situated between two field boundaries.
Assessment
The site crosses the pipeline route and is likely to be affected.

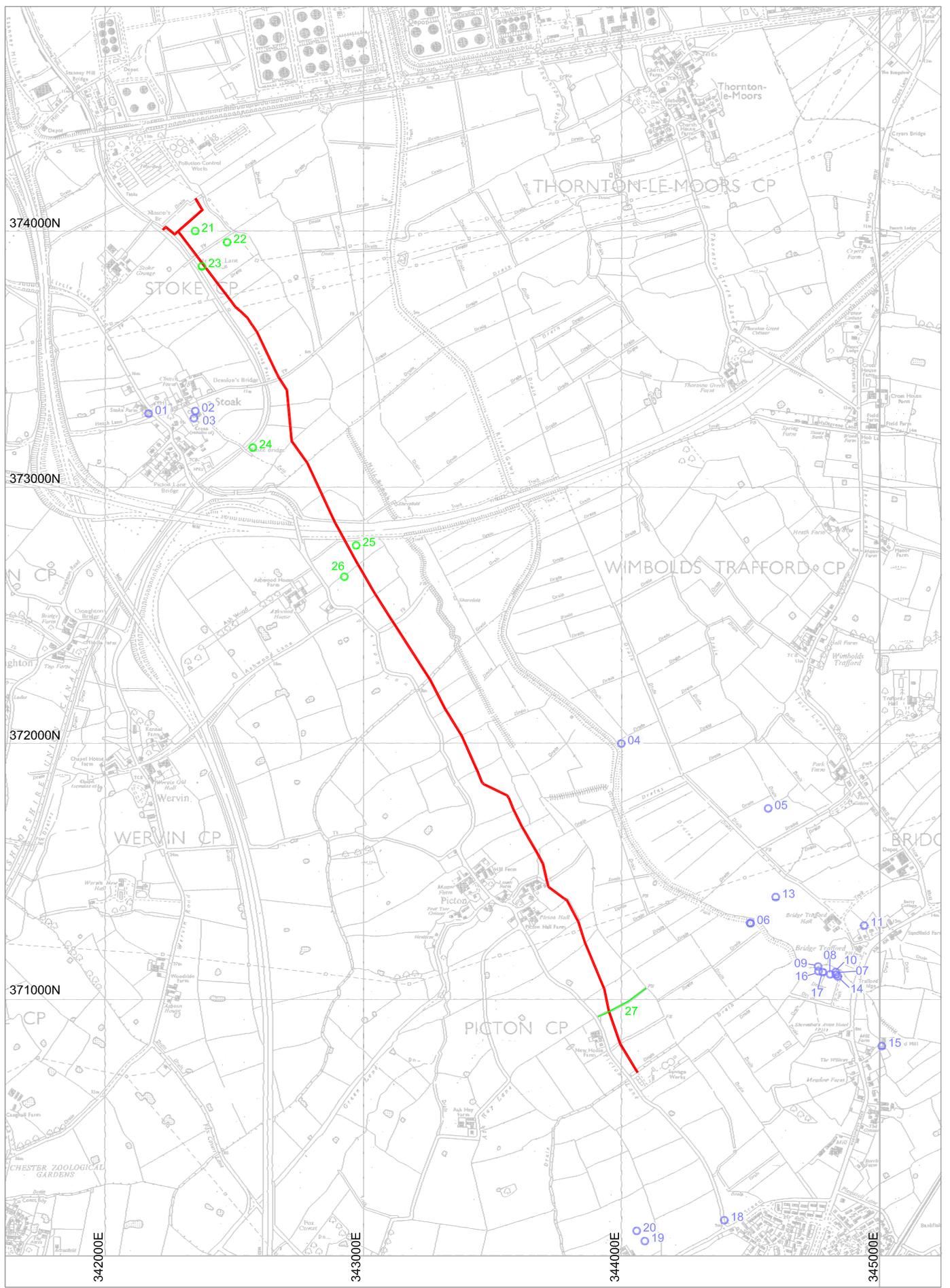


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0 2500 5000
metres

Figure 1: Location map showing route of proposed pipeline



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- 01 gazetteer sites
- 01 sites identified during walkover survey
- pipeline

0 500m
 Scale 1:20,000 @ A4



Figure 2 : Gazetteer sites

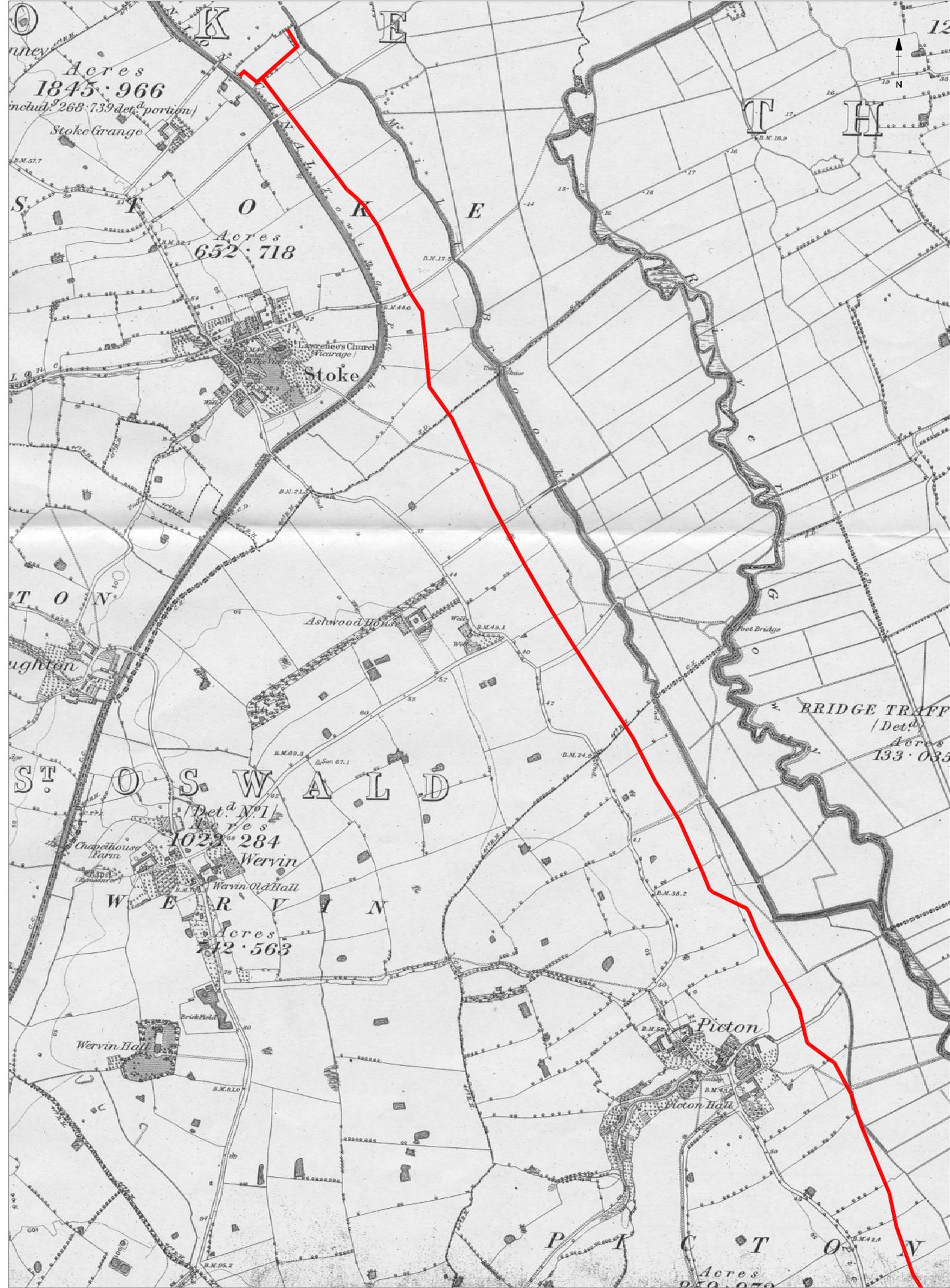
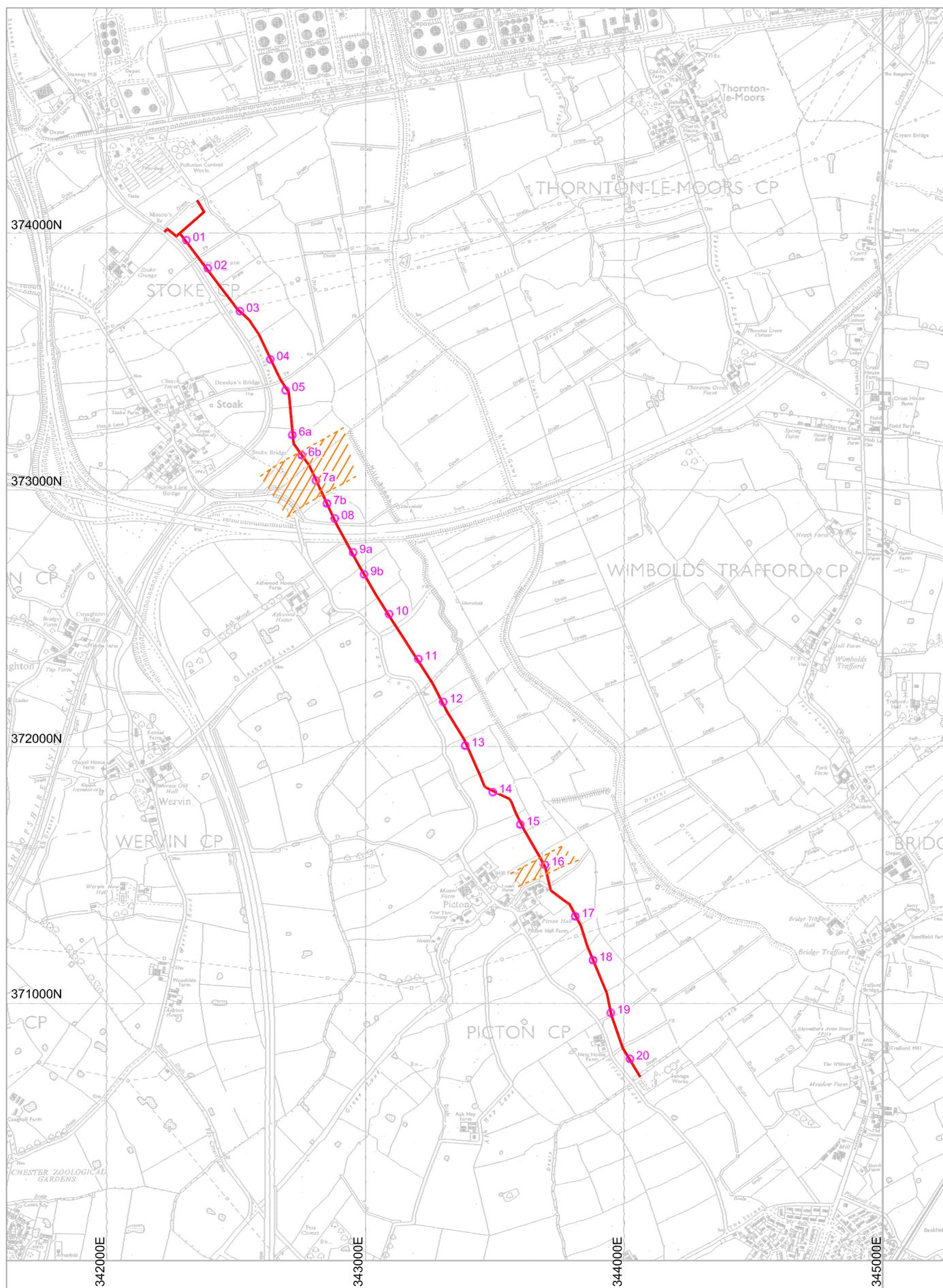


Figure 3: OS 1st edition showing the proposed pipeline route



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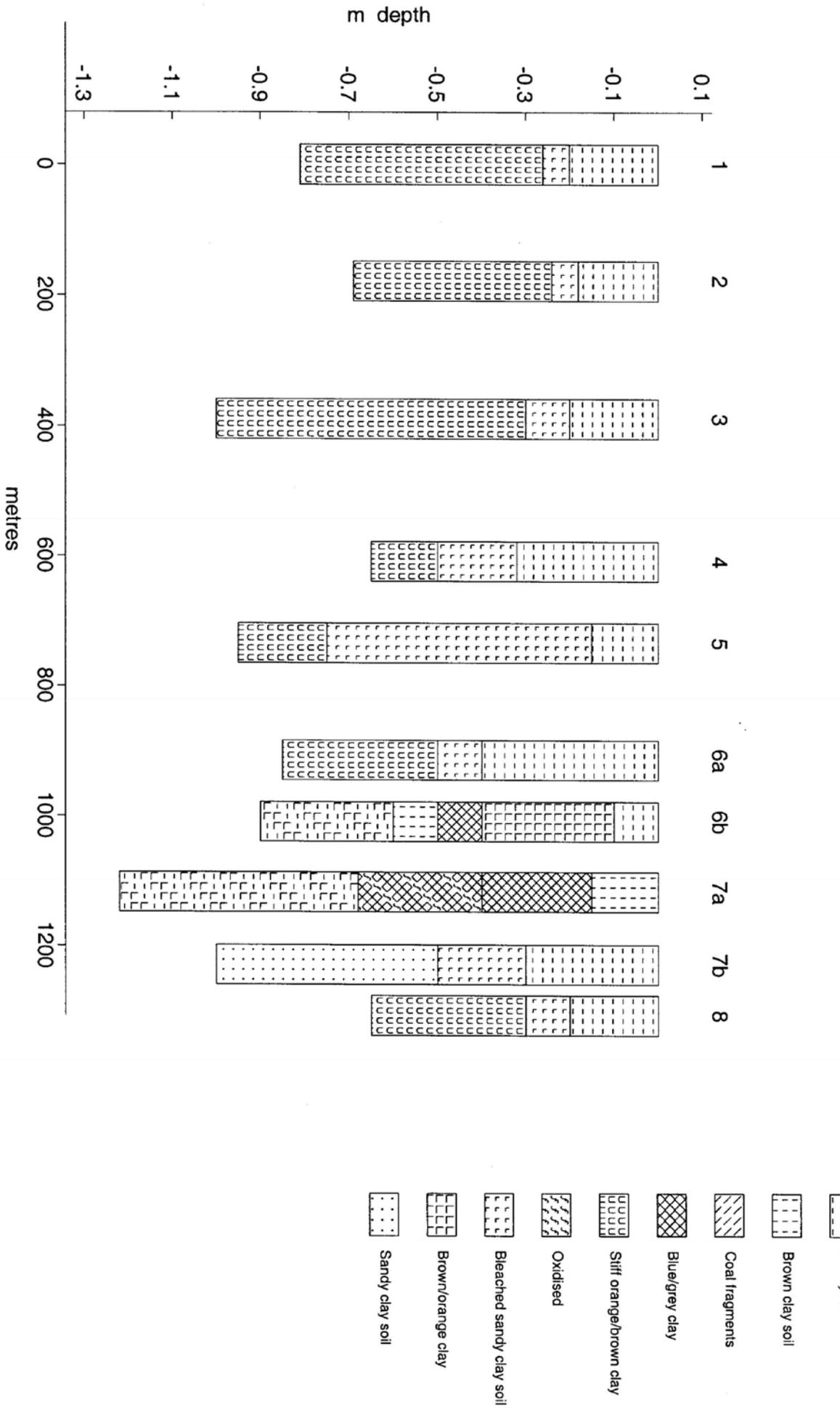
-  position of cores
-  position of palaeochannels
-  pipeline

0 500m
Scale 1:20,000 @ A4



Figure 4: Proposed pipeline route showing position of cores and palaeochannels

location of cores shown on Figure 4



Key

-  Sandy soil
-  Brown clay soil
-  Coal fragments
-  Blue/grey clay
-  Silt orange/brown clay
-  Oxidised
-  Bleached sandy clay soil
-  Brown/orange clay
-  Sandy clay soil

Figure 5a: Soil stratigraphy of the proposed route, cores 1-8



Location of cores shown on Figure 4

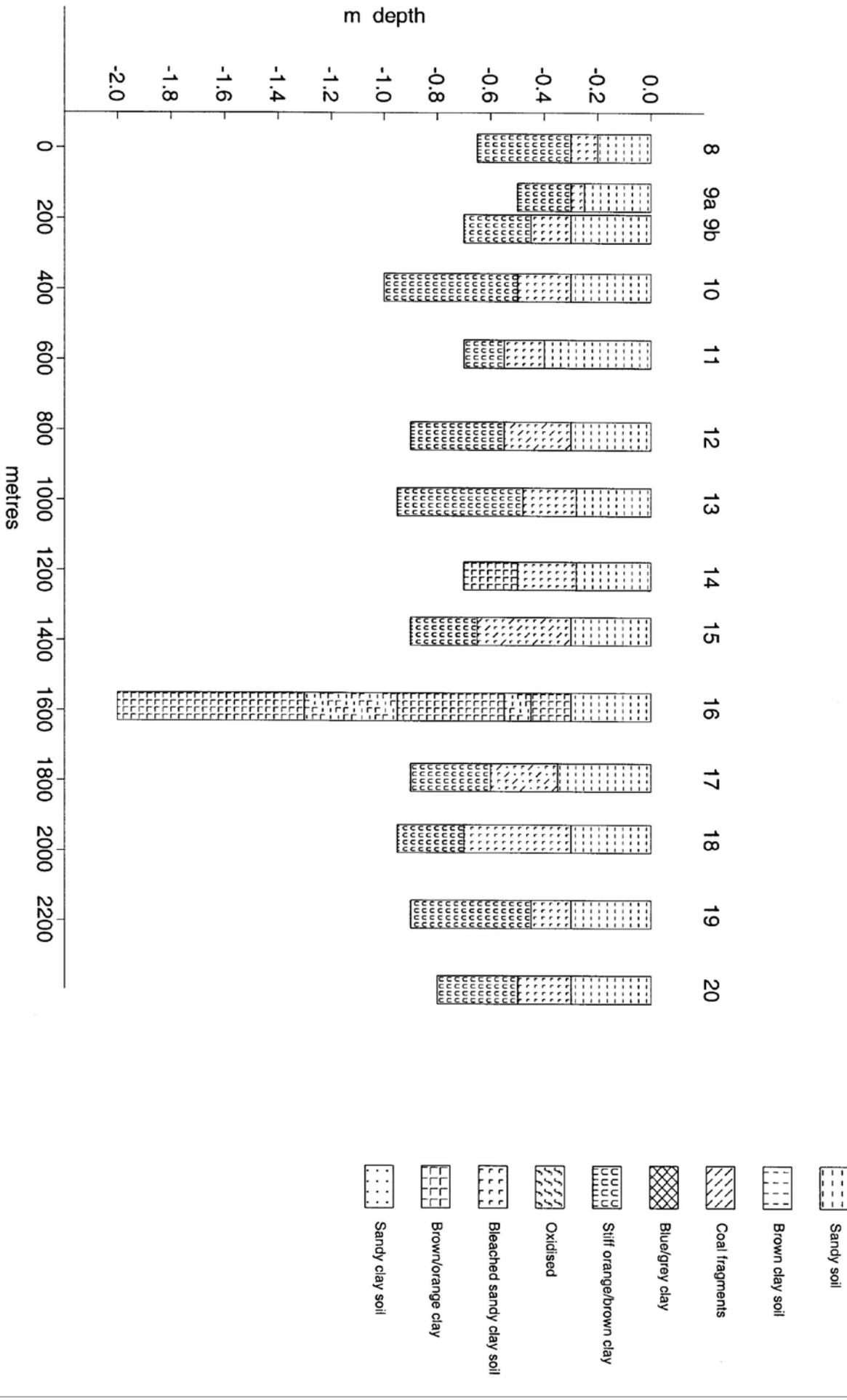
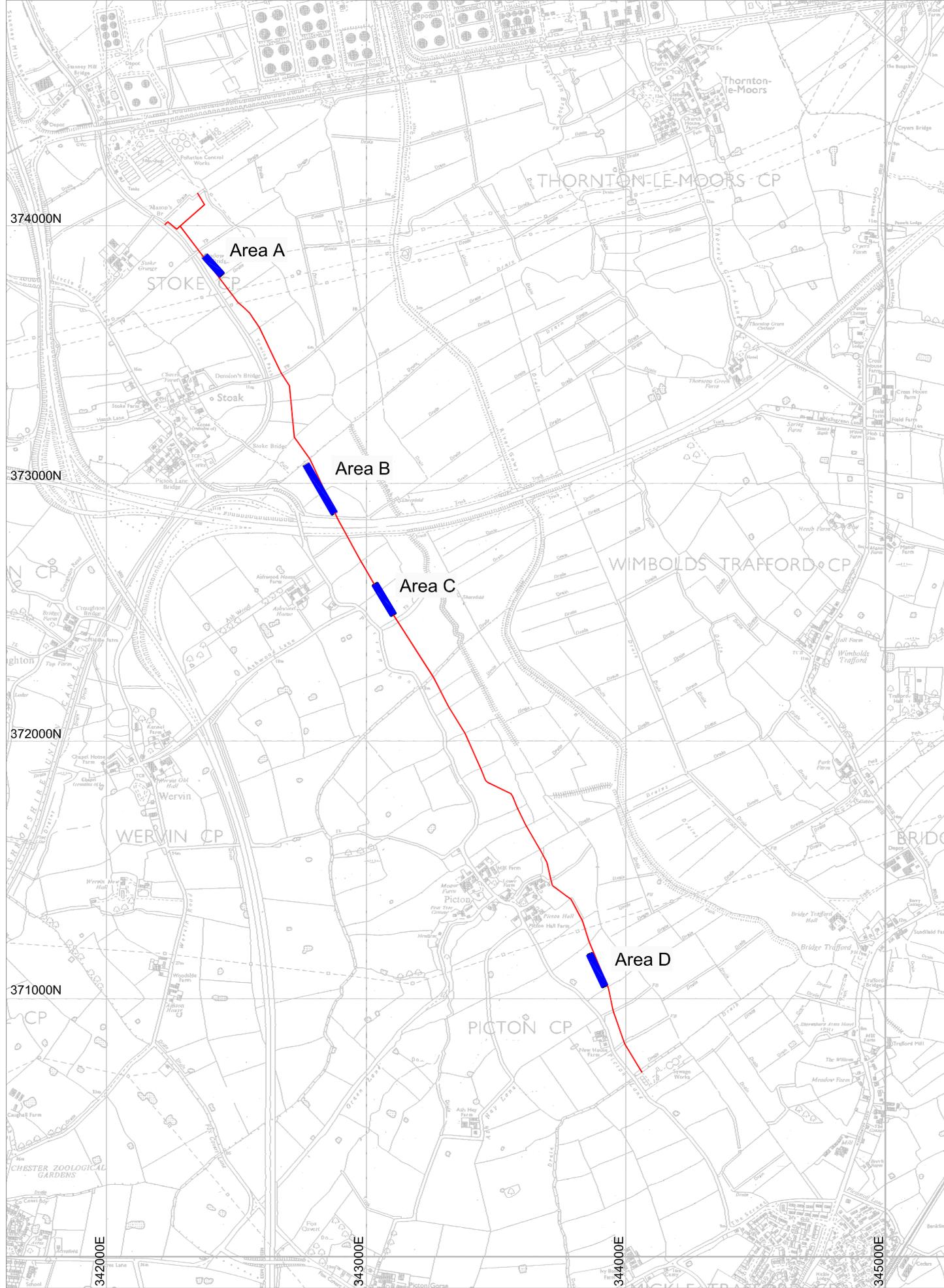


Figure 5b: Soil stratigraphy of the proposed route, cores 8-20





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■ geophysical survey areas
— pipeline

0 500m
 Scale 1:20,000 @ A4



Figure 6: Location map displaying sites of detailed geophysical survey



Plate 1: Site **21**, trackway, looking north-east



Plate 2: Site **26**, possible former field ponds, looking west



Plate 3: Site 27, disused trackway, looking south-west



Plate 4: General site shot, taken from Dension's Bridge, looking south-east



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