M1/16

PROPOSED

CANDLESBY TO SWABY PIPELINE

ARCHAEOLOGICAL DESK-BASED ASSESSMENT

Prepared by

NETWORK ARCHAEOLOGY LTD

for

TRANSCO EAST AREA

Report No. 161

May 2001

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Contents

1. SUMMARY

1.1 General

1.1.1 This archaeological desk-based assessment deals with the proposed 315mm, 11km long pipeline between Candlesby (TF44800 69700) and Swaby (TF37900 77100) in the district of ~~North~~ EAST Lindsey, Lincolnshire (Figure 1).

1.1.2 The assessment has not highlighted the need for any re-routes due to archaeological concerns.

1.1.3 The proposed route is to be constructed mostly along the roadside verge with minimal disturbance and possible some re-route through fields.

1.1.4 There are *four* broad areas of archaeological potential within the study corridor: an area of possible prehistoric activity close to the village of Skendleby, where two known Neolithic long barrows are located; an area of cropmarks near Driby Top; earthwork remains of a Shrunken Medieval Village (SMV) at Calceby; and, if the proposed re-route is approved, the course of the Lincoln to Burgh-le-Marsh Roman Road.

1.1.5 There is a moderate amount of *known* archaeology within the pipeline corridor. The majority of this consists of listed buildings and earthworks, crop and soil marks and field-systems. As a result of the continued agricultural usage of the area, and subsequent lack of development, it is likely that sub-surface archaeology may wait detection. The construction of two earlier pipelines in the study corridor, both revealed archaeological features.

1.1.6 Evidence of Prehistoric activity in the vicinity of the corridor tends to be linked with burial practices, and a number of known long barrows of Neolithic date lie just beyond the study corridor. Earthwork and cropmarks indicate the possibility of other barrows along the corridor.

1.1.7 Romano-British artefacts have been recovered from the area, and the Bluestone Heath Road is known to follow the course of a Roman Road connecting Lincoln with the coast. In addition, excavations close to the study corridor produced evidence of small scale Roman settlement adjacent to the Roman Road.

1.1.8 Archaeological evidence of Saxon activity in the study area is sparse. A small quantity of Saxo-Norman pottery was recovered from the northern end of the route. Documentary evidence suggests that there may have been a moot at a ford in Calceby. Place-names indicate that the villages located along the proposed route were founded by the late Saxon period.

1.1.9 Medieval sites are well represented in the study corridor. These include the Deserted Medieval Village (DMV) of Calceby and the Shrunken Medieval Village (SMV) of Ulceby. The stone remains of Calceby church are still evident. Earthwork ridge and furrow (Medieval field systems) has also been recorded in the study corridor.

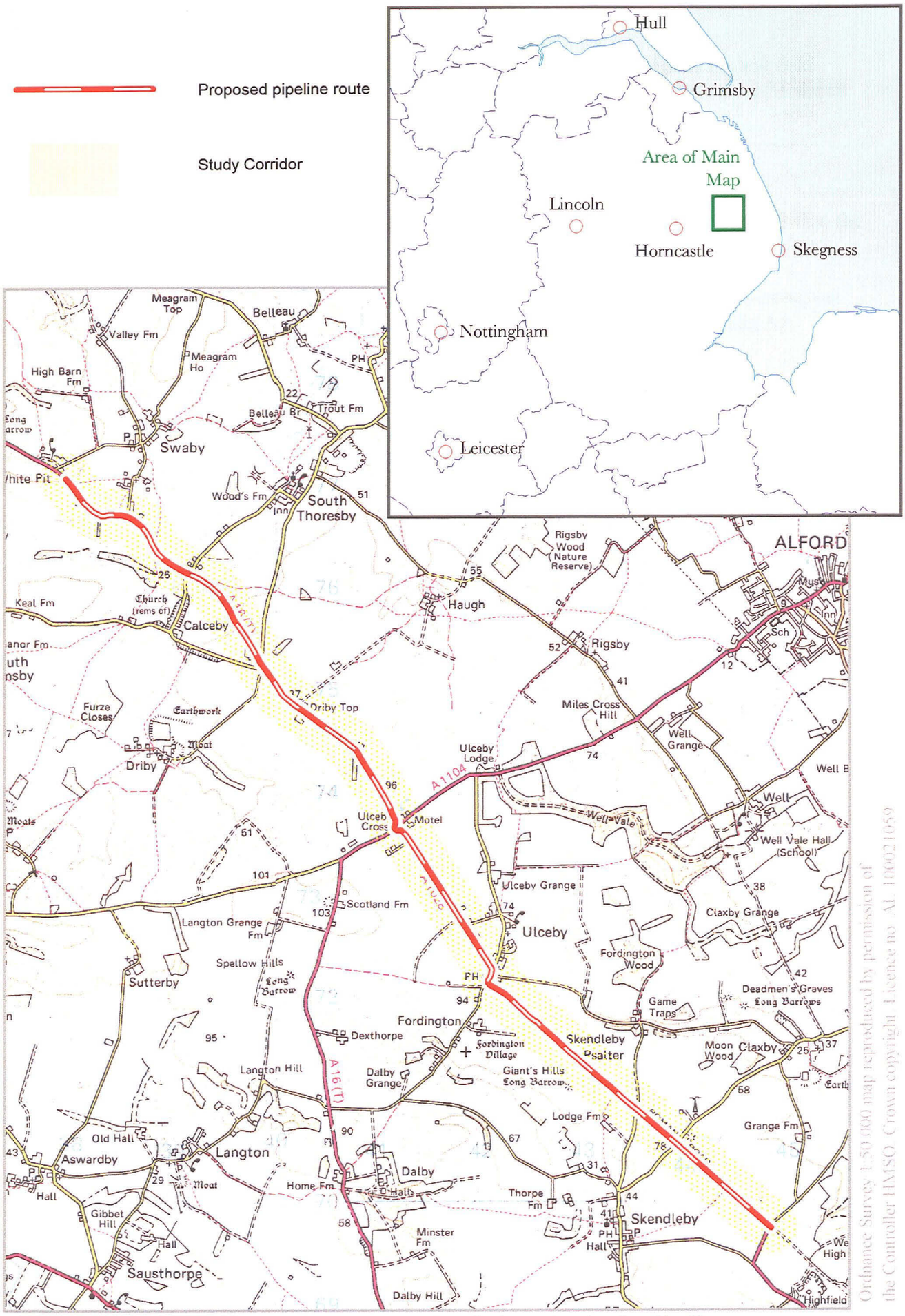

Figure 1: Location of the proposed Candlesby to Swaby Gas Pipeline

1.1.10 Evidence for Post-Medieval activity includes buildings, road alignments and field boundaries. In general however, the landscape has changed very little since Medieval times.

1.2 General Impacts and Recommendations

1.2.1 A lack of previous systematic field-based research in the study corridor means that the potential for archaeological remains is undetermined.

The most cost-effective and proven means of managing the potential archaeological risks is to implement a stage of field investigation (Stage 3 - see Appendix A):

- field reconnaissance survey (entire route)
- study of any bore-hole/geological survey data to identify any areas of colluvium or alluvium that may mask earlier archaeological deposits

The above may lead to:

- geophysical survey (*on areas of undisturbed land (excluding deep alluvium)*). A preliminary magnetic scan may be appropriate, to determine whether more detailed geophysical survey would be useful and effective
- structured fieldwalking survey (*of any arable areas*)
- topographical survey (and reinstatement) of any earthwork features

1.2.2 Depending on the results of the field survey, trial trenching (Stage 4) and excavation or mitigation (Stage 5) may be required along specific parts of the route.

1.2.3 During construction a watching brief on all areas of previously undisturbed ground is recommended with provision made for the recording of any archaeological features.

1.3 Site-Specific Impacts and Recommendations

1.3.1 Thirty-six known archaeological sites have been identified within the study corridor. Of these, thirteen are located in the path of the proposed pipeline, and there is an uncertain impact on another five sites.

1.3.2 All of the sites have been placed into one of five categories, ranging in significance from Scheduled Ancient Monuments (category A) to single find spots (category E) (see table below).

1.3.3 Most of the sites are avoidable or of insufficient significance to require avoidance. At this stage, avoidance has not been recommended for any sites.

1.3.4 It is recommended that field reconnaissance of the entire route is undertaken prior to construction. Detailed fieldwalking and geophysical survey of the entire route is not considered necessary, but it is recommended that these surveys are undertaken in areas where the pipeline runs through fields rather than along the verge, for example the proposed re-route close to Ulceby.

1.3.5 Archaeological trial trenching of the Lincoln to Burgh-le-Marsh Roman road in the area of the proposed re-route may be necessary, possibly followed by excavation or mitigation, depending on the results of the evaluation.

Description	Category	Total no. sites recorded	Total no. sites within study corridor	Total no. sites indirectly and possibly affected by pipeline	Total no. sites crossed by pipeline working width (if there is a stripped easement)
Legally protected site	A	4	2	0	0
Nationally or regionally important site; currently not legally protected	B	14	5	2	0
Locally important site and/or site of uncertain character and/or date	C	15	15	2	9
Other site	D	3	2	1	0
Single find spot, modern feature	E	15	12	1	4
TOTALS		51	36	6	13

Total number of sites recorded, those within study corridor, those indirectly and possibly affected by pipeline construction, and those crossed by proposed pipeline working width

2. INTRODUCTION

2.1 General

2.1.1 In April 2001, Network Archaeology Limited was commissioned by Transco East Area to carry out an Archaeological Desk-Based Assessment of the proposed Candlesby to Swaby Gas Reinforcement Pipeline. This proposed route runs approximately south-east to north-west for some 11km. It begins approximately 2km north-east of Candlesby (TF 44800 69700), following the route of the Bluestone Heath Road (A1028) through Ulceby, Driby and Calceby, terminating close to White Pit Farm, 1km to the west of Swaby (TF 37900 77100), in the county of Lincolnshire.

2.1.2 The pipeline is being built under the Environmental Impact Assessment Regulations.

2.1.3 The diameter of the pipe will be 315mm. It is proposed that the majority of the pipeline will be constructed along the roadside verge, using a 350mm trenching machine with no topsoil strip. A trench measuring approximatley 350mm wide and a minimum of 1.4m deep will therefore be excavated, providing the opportunity for any archaeological remains to be recorded in the pipetrench.

2.1.4 There is a proposed alteration to the route, close to Ulceby. This re-route measures approximately 450m in length and will be located in pasture fields located to the east of the village. This section would require topsoilstripping within a 10m wide easement. The potential damage to any surviving archaeological remains in this area is greater than along the roadside verge, and would therefore require further work prior to construction (Appendix A, Stages 3-5).

2.2 Context of Pipeline Assessments

2.2.1 Linear developments such as pipelines provide an opportunity to examine a transect across a landscape and the evidence of any past human activity preserved within it.

2.2.2 Potentially, pipelines can severely impact upon the archaeological resource. Close co-operation between archaeologist and engineer is essential to ensure that the impact on the archaeological resource is minimised.

2.2.3 Identification of archaeological sites at an early stage allows for forward planning of appropriate mitigation measures, such as route modifications, and site specific investigations in advance of construction.

2.3 Project Objectives

2.3.1 The purpose of this assessment is to consider the cultural heritage implications of the proposed pipeline, and to assist in the selection of an archaeologically least-damaging pipeline route, and to provide a basis for further stages of investigation.

2.3.2 The objectives are to:

- identify and define the extent of known archaeological constraints within and immediately outside the proposed pipeline corridor, and to provide a preliminary assessment of their significance.
- make an informed assessment of the potential for new sites.
- assess the potential for evaluative field survey.
- recommend mitigation measures.

3. METHOD OF ASSESSMENT

3.1 General

3.1.1 This assessment has been conducted according to the Institute of Field Archaeologists' *Code of Conduct* (1997) and *Standard and Guidance for Archaeological Desk-based Assessment* (1994).

3.2 Study Corridor

3.2.1 Data collection focused on a 500m-wide study corridor centred on the proposed pipeline route, but also included relevant sites beyond this corridor. Background information for the localities through which the corridor passes was additionally recorded in order to provide a broader archaeological landscape context for the corridor information.

3.3 Data Sources

3.3.1 On the advice of the Senior Built Environment Officer (SBEO) a condensed archaeological desk-based assessment has been undertaken. The National Monuments Record (NMR) MONARCH database and collection of NMR verticle and oblique photographs were therefore not consulted. All information was collected from county-based sources.

3.3.2 *Sites and Monuments Records*

- County list of known archaeological sites and finds
- County-based reports and records
- National Mapping Programme of Aerial Photographs

3.3.4 *Local Public Record Office:*

- enclosure maps
- tithe maps
- Ordnance Survey maps: 1st edition 25" to 1 mile and 1st edition 6" to 1 mile
- secondary printed sources

4. DESCRIPTION OF THE PROPOSED PIPELINE ROUTE

4.1 Location and Topography

4.1.1 The proposed route runs for approximately 11km through the district of East Lindsey in Lincolnshire.

4.1.2 The route runs roughly south-east to north-west, beginning approximately 2km north-east of Candlesby (TF 44800 69700), following the route of the Bluestone Heath Road (A1028) through Ulceby, Driby and Calceby, terminating close to White Pit Farm, 1km to the west of Swaby (TF 37900 77100).

4.1.3 The topography of the land undulates gradually, rising to 90m OD.

4.2 Geology, Soils and Land Use

4.2.1 The proposed pipeline route lies on the eastern edge of the Lincolnshire Wolds, on a band of chalk approximatley 70km long. The majority of the route lies on Upper Cretaceous chalks. Towards the north of the route, close to Calceby, the solid geology consists of Lower Greensand deposited during the Lower Cretaceous period.

4.2.2 The soils are moderately well-drained, fine-grained silty clays.

4.2.3 The area is predominantly agricultural, the majority of the land being cultivated for crops.The pipeline will be constructed along the roadside verge.

5. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

5.1 General

There is evidence of occupation within the study area since prehistoric times. The proposed pipeline route lies on the edge of the Wolds, offering higher, better drained land than the surrounding fenland. The locality continued to be settled throughout the Romano-British, Medieval and Post-Medieval periods and into the present day.

5.2 Palaeolithic (*c.*250,000 years ago)

5.2.1 There is very little evidence of activity during the Palaeolithic period. Lincolnshire lies on the northern fringe of the British distribution of Lower Palaeolithic implements (May 1976). Although the area through which the proposed pipeline route runs remained as dry land during the Middle and Upper Palaeolithic, no artefacts dating to this period have been located in or close to the immediate vicinity of the study corridor.

5.3 Mesolithic (c.8,300 BC)

5.3.1 No known sites or artefacts dating to the Mesolithic period are located in or close to the proposed pipeline route.

5.4 Neolithic (*c.*4,500 BC)

5.4.1 Increased activity in the region during the Neolithic period is suggested by a number of artefacts and sites identified. Few Neolithic settlement sites have been identified, examples of small scale settlements are located at Dragonby and Walesby (May 1976). In contrast however, a large number of barrows have been recorded, in particular in the central and southern areas of the Wolds. A number of Long Barrows have been identified in the vicinity of the pipeline; Deadmen's Graves (Claxby -by-Alford) and the Giant's Hills Long Barrows (Scheduled Ancient Monument (SAM) 74, SAM27872 and SAM 27867) (Skendleby) are located close to the southern end of the route, with a further two long barrows approximately 450m from the northern end of the route, at Walmsgate (Sites and Monumnets Record (SMR) 43173, 43176). The excavation of one of the Giant's Hills Barrows produced eight human burials, and a large quantity of artefacts.

5.4.2 The distribution of flint axes in North Lincolnshire is high, and a number of flint artefacts have been located in the immediate vicinity of the pipeline. In addition, a large quantity of pottery was recovered during the excavation of one of the barrows. A polished stone axe was located close to the northern end of the route.

5.5 Bronze Age (*c.*2,500 BC)

5.5.1 The evidence of Bronze Age activity in the study area is minimal. The only securely dated find from the study area is a polished stone archer's bracer. A crop mark barrow located close to Calcify is thought to be of Bronze Age date (LI.82.8.1).

5.6 Iron Age (*c.*600BC)

5.6.1 At the time of the Roman conquest Lincolnshire lay within the tribal territory of the *Coritani*. There is a large amount of archaeological evidence for this period throughout the county, but only one site dating to the Iron Age is recorded in the study corridor (SMR 43199).

5.7 Romano-British (AD 43)

5.7.1 Lincoln was a major town during the Roman period, and a number of roads radiated from the centre to connect it with other major towns, and the surrounding countryside. One of the routes running northwards from Lincoln (now known as Wragby Road) forks into two, close to Langworth, one arm of which continued south-eastwards, skirting to the north of Horncastle, passing through Ulceby and on to Burgh-le-Marsh (SMR 42944; 43817). This road is numbered 27 in the standard work of Margary, and can be traced as far as Burgh-le-Marsh. It is believed that it would have continued to the coast, possible close to Skegness or Gibraltar Point. Near Ulceby, it probably connected with the Bluestone Heath road, which is thought to have prehistoric origins. The course of this road continues to be used, and the location and organisation of the surrounding Medieval buildings suggests that the road has continued in use since then.

5.7.2 Excavations, carried out by Canon Tatham between 1913 and 1923, to the east of the proposed route have revealed the remains of small scale Roman roadside settlement.

5.8 Early Medieval (AD 410)

5.8.2 Old English elements in place-names and the numerous settlements recorded in the Domesday Book (1086 AD) indicate that this area was extensively occupied by the late Saxon period.

5.9 Medieval (AD 1066)

5.9.1 The Deserted Medieval Village (DMV) of Calceby (SMR42444) lies to the west of the study corridor. In 1377 sixty people paid poll tax in the village, but by 1563, this had been reduced to eighteen families. The remains of the Norman church of St Andrew survive as a ruin, approximately 5m high. Documentary evidence records that the last priest was instituted at this church in 1540-1570.

5.9.2 The earthwork remains of the Shrunken Medieval Village (SMV) of Ulceby (SMR 42032) lie close to the proposed pipeline route. Ulceby was originally mentioned in the Domesday Book, but by 1450, it was much reduced and had united with the neighbouring village of Fordington.

5.9.3 A number of Medieval field systems, including remnant ridge and furrow have been recorded in the locality of the pipeline.

5.10 **Post-Medieval** (AD 1485)

5.10.1 The settlement pattern between the Medieval and Post-Medieval period has changed very little. The villages themselves have seen little change, with no new housing estates being built onto existing villages.

5.10.2 Two nineteenth century listed buildings lie just beyond the study corridor in Ulceby. Peacocks, a Grade II listed building, formerly the rectory, was built in 1850 being altered during the twentieth century. The second, also Grade II listed, is the Parish Church, located on the east side of Church Road. This was initially constructed in 1826, with a porch added in 1893.

5.10.3 The Industrial Age of the eighteenth and nineteenth centuries led to striking changes in Lincolnshire. In 1765 four acts for turnpike roads were passed in the vicinity of the proposed pipeline route, one of which related to the Black Heath Road and a railway ran through Ulceby as early as 1848.

5.11 **Modern**

5.11.1 The area through which the proposed pipeline runs has essentially remained unchanged since the Medieval and Post-Medieval periods, retaining its agrarian character and small villages. Many field boundaries have been removed to create larger, more profitable fields.

5.11.2 The railway, located to the east of the proposed pipeline is no longer in use, and has been dismantled.

5.12 **Undated**

5.12.1 A number of sites of undetermined date have been identified.

6. EXPLANATION OF GAZETTEER

6.1 The information gathered from the assessment work is summarised for each constraint map (*Appendix D*) as a Gazetteer of Archaeological Sites, in *Appendix C*. This lists all sites of archaeological interest located within, and immediately outside the 500 metre study area.

6.2 Information retrieved from public data sources is listed by SAM (Scheduled Ancient Monument), SMR (Sites and Monuments Record) and NMP (National Mapping Programme) number in the Gazetteer. The NMP numbers are prefixed by LI. Previously unrecorded sites found from cartographic sources during the course of this desk-based assessment are referred to as DBA sites, identified by a letter suffix.

7. CRITERIA FOR GRADING SITES

7.1 General

Sites identified during this study were graded on two criteria:

- Importance
- Impact

7.2 Importance

7.2.1 The sites have been placed into one of five categories, A to E, as shown in the table below (Table 1). Although based on all the collated information, the inclusion of a site in a particular category often involved a degree of subjective judgement. Categories are not fixed and there is every possibility that the classification of a site may change as a result of findings made during later stages of investigation.

	A	B	C	D	E
Description	Legally protected site	Nationally or regionally important site, currently not legally protected	Locally important site and/or site of uncertain character and/or date	Other site	Single find spot, modern feature
Examples	Scheduled Ancient Monuments and listed buildings	Burial sites, historic buildings, settlements e.g. Roman villas, Deserted Medieval villages.	Possible Settlements, Field Systems, finds scatters, former buildings, Roman roads & other ancient track ways	Ridge and furrow, unidentified features from aerial photographs	Single find spots of various dates, modern Field Boundaries, drains & ponds
Mitigation	To be avoided	To be avoided	Avoidance recommended	Avoidance not recommended at this stage	Avoidance unlikely to be recommended

Table 1: Site category definitions

7.3 Impact

7.3.1 The potential impact of the proposed pipeline on the archaeological resource will be:

- *Direct (D)* - physical damage including compaction and/or partial or total removal of deposits
  - severance of archaeological features, in particular linear features
- *Indirect (I)* - visual intrusion, affecting the aesthetic setting of sites or landscape features
  - disturbances caused by vibration, dewatering, change in hydrology,

Much of the impact will occur during the construction phase of the proposed pipeline: topsoil stripping, soil storage, movement of heavy machinery, excavation of the pipe trench and easement reinstatement can all have a permanent, damaging effect on the archaeological resource.

7.3.2 The level of impact will vary:

- *Severe (sev):* entire or almost entire destruction of deposits
- *Major (maj):* a high ratio of damage or destruction to deposits
- *Minor (min):* a low ratio of damage to surviving archaeological deposits
- *None (-):* no impact due to distance from the proposed pipeline easement, and/or construction technique
- *Uncertain (Unc):* e.g. because the quality and extent of deposits are unknown, or because construction techniques have not yet been decided.

7.3.3 Factors affecting the significance of impact include:

- the proportion of the site or feature affected.
- the integrity of the site or feature; impacts may be reduced if there is pre-existing damage or disturbance of a site.
- the nature, potential and heritage value of a site or feature.

8. RELIABILITY AND POTENTIAL LIMITATIONS OF DATA

8.1 The limitations of an impact assessment of the proposed pipeline include:

- the lack of clarity surrounding the extent of some sites. This makes it difficult to provide a precise assessment of potential impact.
- the possibility that *unknown* sites will be encountered along the route.

The development of mitigation strategies should take these points into consideration.

8.2 Information held by public data sources can normally be assumed to be reliable, but uncertainty can arise in a number of ways:

- The SMR can be limited because it depends on random opportunities for research, fieldwork and discovery.
- Documentary sources are rare before the Medieval period, and as documents were not usually compiled for archaeological purposes, are inherently biased.
- Primary sources, especially older records, often fail to accurately locate sites and are obviously very subjective in any interpretation.
- There may be a lack of dating evidence for sites.
- The usefulness of aerial photographs depends upon geology, land use and weather conditions when the photographs were taken. Some types of remains do not produce crop, soil or vegetation marks. Aerial photographs necessarily involve some subjective interpretation of the nature of sites.

The gazetteer (*Appendix C*) provides an indication of the reliability of each source of information.

9. ASSESSMENT OF IMPACT AND RECOMMENDATIONS

9.1 General Impact and Recommendations

9.1.1 This desk-based assessment is a summary of the current level of archaeological knowledge where the archaeology happens to coincide with the proposed pipeline corridor. Generally, areas which are apparently blank have never been archaeologically investigated, and therefore have an *undetermined* archaeological potential.

9.1.2 The most cost-effective means of managing archaeological risks is to implement a staged approach to investigation and mitigation, as laid out in Appendix A. This assessment report represents Stage 2. The next recommended stage of work is field survey (Stage 3). This would normally consist of field reconnaissance survey, fieldwalking, and geophysical survey, all of which, subject to site conditions, would usually be conducted along the entire length of the route. As the majority of the Candlesby to Swaby pipeline is to be constructed along the roadside verge, geophysics and fieldwalking along the entire route is unfeasible and therefore not recommended. The proposed re-route would involve topsoil stripping, and it is likely that a geophysical survey of this area would be recommended.

9.1.3 A site visit and field reconnaissance survey are recommended prior to construction.

9.1.4 During construction a watching brief on all areas of previously undisturbed ground is recommended. Topsoil stripping along the proposed re-route would also require a permanent presence watcing brief.

9.1.5 In addition to the proposed pipeline working width, the watching brief investigations should also cover the sites used for associated engineering works, such as pipe storage areas, site compounds, road crossing easements and block valve sites, as and when these areas become known.

9.1.6 Field Reconnaissance Survey

A detailed walk-through and recording of field conditions and earthworks is recommended.

This is a visual inspection of the proposed pipeline route which should fulfill two main aims:

- to locate and characterise archaeology represented by above ground remains (earthworks).
- to record and correlate the nature and condition of existing field boundaries crossed by the route with the results of a hedgerow survey, in order to determine whether existing boundaries are of potential antiquity (see 9.3.3 *Hedgerow Regulations*).

Recommendations: Detailed field reconnaissance of the entire pipeline route.

9.1.7 Access to any bore-hole/geological survey data carried out by the client prior to works. This will provide information on:

•Any areas of colluvium/alluvium that may conceal archaeology

•Any changes in geology that may provide better ground conditions for settlement

9.1.8 Fieldwalking Survey

The distribution of finds found by fieldwalking can indicate areas of archaeological activity, which are not represented by above ground remains.

Recommendations: A detailed fieldwalking survey of any sections of the pipeline constructed through fields is recommended, for example along the proposed re-route near Ulceby.

9.1.9 Geophysical Survey

Geophysical survey methods are non-intrusive and can detect and precisely locate buried archaeological features.

Recommendations: It is not considered necessary to carry out geophysical survey of the entire pipeline route due to the presence of existing services and previous groundworks. However, survey along the re-route is recommended.

9.1.10 Future Mitigation Measures

Later stages of archaeological investigation and mitigation may be recommended in response to the results of the Stage 3 field surveys:

- ***Avoidance***

Every effort should be made to avoid an impact upon significant archaeological constraints, either by minor alterations to the proposed route, or by engineering methods, such as boring.

- ***Minimisation of Impact***

The impact upon unavoidable archaeological sites should be minimised by reduction of the working width to the minimum practical level, and/or the laying of geotextile matting or bog mats, and/or careful reinstatement procedures (e.g. avoidance of subsoil ripping over archaeological sites).

- ***Evaluation*** (*Appendix A - Stage 4*)

Significant and unavoidable archaeological constraints identified by the desk-based assessment or field surveys, will require archaeological *evaluation* in advance of construction. Evaluation might involve machine-excavated trenches, hand-dug test-pits and/or hand auguring of specific sites within the proposed pipeline's working width. The objectives are to confirm the presence or absence of archaeological deposits, to determine their character, extent, date and state of preservation, and to produce a report on the findings.

- ***Excavation*** *(Appendix A - Stage 5)*

It may not be possible or desirable to avoid significant archaeological sites identified by an archaeological evaluation. *Excavation* of any such sites should take place in advance of construction. Excavation would involve machine-stripping of limited, open areas within the working width, followed by archaeological investigation. The objectives are to obtain a full record of the archaeological remains prior to construction, and to produce a report on the findings.

9.1.11 Watching Brief, and Post-Construction Archive, Report and Publication *(Appendix A - Stages 6, and 7)*

A watching brief (dependent on the construction techniques and engineering programme) is recommended during all ground-disturbing activities of the construction phase of the project, to record unexpected discoveries, and known sites which did not merit investigation in advance of construction. The main phases of monitoring for the pipeline may be topsoil stripping and, where appropriate, trench excavation. The objectives are to obtain a thorough record of any archaeological remains found during construction, and to produce a report on the findings. Contingencies should allow for salvage excavation of significant, unexpected archaeological sites found during construction.

9.1.12 County Monitoring

Jim Bonnor (Senior Built Environment Officer), should be invited to monitor the implementation of the archaeological project design, and should be informed of any significant archaeological sites found at each stage. Provision should be made for him to monitor fieldwork in progress, and also to visit the construction site.

9.2 Areas of Potential - Impacts and Recommendations

9.2.1 There are three broad areas of potential along the proposed route:

Area 1: Cropmarks close to Giant's Hills Long Barrows, some of which have been identified as potential long barrows.

Area 2: North of Ulceby Cross series of undated cropmark enclosures and trackways, some of which are thought to be of possible prehistoric date.

Area 3: Area around Calceby where there are cropmark and earthwork remains associated with the SMV.

Area 4: The proposed re-route at the southern end of the route lies close to the course of a Roman Road.

9.2.2 **Area 1**
The presence of Giant's Hills Neolithic Long Barrows and the cropmarks identified close by, suggests the potential for finds of Neolithic date. A watching brief should be undertaken during construction in this area.

9.2.3 **Area 2**
An area of cropmarks located close to Driby Top are thought to be prehistoric in date. These cropmarks consist of a series of enclosures and trackways, possibly representing a small settlement. A watching brief should be undertaken during construction in this area.

9.2.4 **Area 3**
The earthwork remains of Ulceby SMV, and the associated ridge and furrow field system extend across the area of construction. A detailed field reconnaissance of this area should be undertaken and a topographic survey of any earthworks that will be affected by the construction of the pipeline made. A watching brief should be undertaken during construction in this area.

9.2.5 **Area 4**
The proposed pipeline re-route at Ulceby will cross the Roman Road. Detailed fieldwalking and geophysical survey should be undertaken. It may be necessary to carry out an archaeological evaluation (Appendix A, Stage 4), which may lead onto excavation (Appendix 4, Stage5). A watching brief should be undertaken.

9.3 Historic Land Boundaries

9.3.1 Existing field boundaries
Many of these correlate with the position of boundaries marked on Enclosure and Tithe maps and early OS maps.
Impact: Indirect; The proposed pipeline, if constructed along the roadside verge will not impact on any of these boundaries.
Recommendations: The nature and condition of existing field boundaries should be recorded during a reconnaissance survey.

9.3.2 Former Field Boundaries
Former field boundaries have been recorded within the study corridor. The boundaries were seen on tithe maps and early OS maps.
Impact: Indirect; Some of these former field boundaries may be ancient and should be regarded as potentially important historic landscape features.
Recommendations: Field reconnaissance survey should aim to establish whether the former field boundaries are represented by extant bank and ditch remains. It would be appropriate to record a section through any ancient bank and ditch remains, if encountered, during a construction watching brief.

9.4 Site-specific Impacts and Recommendations (see *Appendices C* and *D*)

9.4.1 In an ideal situation, all known archaeological constraints would be avoided. However, this is impractical and in the case of linear landscape features such as roads and

trackways, impossible. For this reason, the known sites have been graded A-E, and the level of impact assessed for each site in order to provide an indication as to the significance of the sites within the study corridor (see Section 7). This information is summarised below in Table 2:

Description	Category	Total no. sites recorded	Total no. sites within study corridor	Total no. sites indirectly and possibly affected by pipeline	Total no. sites crossed by pipeline working width (if there is a stripped easement)
Legally protected site	A	4	2	0	0
Nationally or regionally important site; currently not legally protected	B	14	5	2	0
Locally important site and/or site of uncertain character and/or date	C	15	15	2	9
Other site	D	3	2	1	0
Single find spot, modern feature	E	15	12	1	4
TOTALS		51	36	6	13

Table 2: Total number of sites recorded, those within study corridor, those indirectly and possibly affected by pipeline construction, and those crossed by proposed pipeline working width

9.4.2 The following sections (9.5-9.9) deal in category order with sites that are directly or indirectly affected by the pipeline If more than one 'site' has been recorded at one point these sites have been counted as one site for ease of reference.

9.5 Category A Sites

Two legally protected sites are located within the study corridor, none will be affected by the proposed pipeline construction.

9.6 Category B Sites

Five regionally or nationally important (not legally protected) are located within the study corridor. Two of these lies close to proposed route.

42032 (TF421 729)
Shrunken Medieval Village (SMV) and ridge and furrow, earthwork
Impact: Indirect, uncertain
The earthwork remains of a SMV and associated ridge and furrow field system are located to the east of the pipeline. It is not known at this stage if the construction of the pipeline will impact on the remains.
Recommendations: Field reconnaisance survey of ridge and furrow and earthworks that may be affected by construction. Record any surviving archaeology as part of the watching brief.

DBA:D (TF42070 72237)
Blacksmiths, OS map

Impact: Indirect, uncertain
A former blacksmiths is shown on the First Edition OS map. Although the building still remains, it is no longer used as a blacksmiths. It is possible that artefacts associated with smithing may be recovered.
Recommendations: Record any surviving archaeology as part of the watching brief.

9.7 Category C Sites

Fifteen C sites are located within the study corridor. The proposed route crosses nine sites and lies close to, and therefore as an uncertain impact, on two others. The remaining four sites located within the study corridor are unlikely to be affected by the construction of the pipeline.

42944 (TF5000 6520); **43817** (TF4484 6975) ; **42062** (TF4300 7135- TF4453 7000)
Roman Road
Impact: Direct, severe
The proposed pipeline route follows the route of the known Roman Road from Lincoln to Burgh-le-Marsh. Previous excavations have revealed sections of the road, for example during the construction of a previous gas pipeline (SMR 43817) which is also visible as a soilmark in places. It is likely that the construction of the pipeline will affect any surviving remains of the Roman Road. The proposed re-route will further impact on the remains of the road and any associated roadside settlements.
Recommendations: Detailed fieldwalking and geophysical survey prior to construction. Archaeological trial trenching (Appendix A, Steage 4) followed by archaeological excavations (Appendix A, Stage 5) may also be required.

42441 (TF3952 7532)
Bluestone Heath Road
Impacts: Direct, uncertain
The Bluestone Heath Road running through Calceby is thought to have been used by the Romans and may have its origins in the prehistoric period. There may be earlier road surfaces surviving below the existing surface, and associated roadside ditches. Traces of earlier roads may be encountered.
Recommendations: Record any surviving evidence of earlier road surfaces or associated features during the watching brief.

LI.24.10.1- LI.24.14.1 (TF4062 7411)
Enclosure, cropmark
Impact: Indirect, uncertain
Cropmarks of enclosures of possible prehistoric date, two undated enclosures and two trackways of undetermined date lie to the west of the proposed pipeline, close to Driby Top, forming a complex of cropmarks identified here. The close proximity of these remains to the proposed route suggests that related/similar remains may be exposed.
Recommendations: Record any remains as part of the watching brief.

43199 (TF4279 7175)
Iron Age Farmstead, cropmarks
Impact: Indirect, uncertain

A series of enclosures and hut circles visible as cropmarks are located close to the eastern edge of the study corridor. Although these are not directly affected by the proposed pipeline route, they may form part of a wider complex, which may branch out into the working area.
Recommendations: Record any archaeological remains as part of the watching brief.

9.8 Category D Sites

Two Category D sites, an excavated pit (SMR 42440) and the possible site of a Medieval moot (SMR 43907), were located within the study corridor, neither will be directly affected by the construction of the pipeline.
Recommendations: Record any surviving features as part of the watching brief.

9.9 Category E Sites

Fifteen Category E sites are located within the study area, of which five are directly affected by the proposed pipeline. Of those directly affected by the pipeline, two are areas of former field boundaries; one a Post-Medieval trackway; one the remains of an earlier Post-Medieval road surface and one a single find spot.
Recommendations: Record any archaeology as part of a watching brief.

43316 (TF4114 7367)
Ulceby Cross Roads, former road surface and alignment
Impact: Direct, Uncertain
It is likely that the earlier Post-Medieval road surface will be revealed during the construction of the pipeline.
Recommendations: Record any surviving features as part of the watching brief.

DBA:H (TF41085 74220)
Former field boundaries, OS map
Impact: Direct, Uncertain
It is likely that these field boundaries may be revealed during the construction of the pipeline.
Recommendations: Record any surviving features as part of the watching brief.

DBA:F (TF43622 70481)
Former field boundaries
Impact: Direct, Uncertain
It is likely that these field boundaries may be revealed during the construction of the pipeline.
Recommendations: Record any surviving features as part of the watching brief.

DBA:G (TF40268 74810 - 40354 74895)
Trackway, OS map
Impact: Direct, Uncertain
It is possible that this trackway may be revealed during the construction of the pipeline.
Recommendations: Record any surviving features as part of the watching brief.

10. STATEMENT OF INDEMNITY

Every effort has been taken in the preparation and submission of this report in order to provide as complete an assessment as possible within the terms of the brief. All statements and opinions are offered in good faith. Network Archaeology Ltd cannot accept responsibility for errors of fact or opinion resulting from data supplied by any third party, or for any loss or other consequences arising from decisions or actions made upon the basis of facts or opinions expressed in this report and any supplementary papers, howsoever such facts and opinions may have been derived, or as a result of unforeseen discoveries of archaeological sites or artefacts.

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Appendix A

Explanation of Phased Approach to Mitigation Measures

Explanation of Phased Approach to Mitigation

Network Archaeology Ltd recognise seven main phases of work in the archaeological investigation of pipelines.

Stage 1 Feasibility Study
An appraisal of archaeological potential

Stage 2 Desk-based Assessment
A thorough synthesis of available information, as in this report.

Stage 3 Non-intrusive Field Survey

3a *Field Reconnaissance Survey (rapid walkover)*
This involves a visual inspection of the entire length of the proposed pipeline route in order to record the following:

- location and character of unrecorded earthworks
- the level of preservation of known earthworks (e.g. ridge-and-furrow)
- the occurrence of soil and vegetation changes which could indicate the presence of archaeological deposits
- land-use
- topographic variations
- visible geology
- health and safety implications
- the nature and condition of existing field boundaries to be correlated with the results of the hedgerow survey, to determine the antiquity of the boundaries
- project specific requirements

3b *Field walking*
Field walking involves the systematic recovery of artefacts (pottery, tile, glass, slag, coins *etc.*) from the surface of ploughed fields. This exercise is intended to:

- determine the date and spatial extent of *known* sites on the proposed route which could not be avoided by route modifications.
- determine if any *known* sites lying close to the proposed route extend into it.
- locate, delimit and date previously *unknown* sites, lying in the course of the proposed route.

Field walking needs bare earth, ideally ploughed, harrowed and weathered. Late autumn and winter is the optimum time for this work.

3c *Metal Detector Survey*
Metal detecting can be carried out on all types of land. Ideally, detectorists with local experience are used. This exercise:

- complements field walking in arable areas.

- provides the only means of obtaining dating evidence in pasture, fen, moss and woodland areas.
- identifies and date sites that may not be archaeologically visible by field walking (e.g. metal hoards, fair/trading sites, accompanied burials)

3d *Earthwork survey*

This work is undertaken to produce a topographic record of extant earthworks. These sites might include *known* earthworks identified by the Desk based Assessment, or previously *unknown* earthworks found during the Field Reconnaissance Survey. The sites may include settlement earthworks or agricultural earthworks (such as, ridge and furrow and lynchets).

Two methods are commonly employed; plane table survey which obtains a hachure survey, or total-station theodolite survey which produces a close contour plot.

3e *Auger Survey*

The retrieval of sub-surface soil samples can be used to determine the presence or absence, nature, extent and state of preservation of known or potential archaeological deposits. This may be appropriate in areas sealed by peat or alluvium, or on sensitive sites such as earthworks. Areas requiring auger survey can be identified during or shortly after the field reconnaissance and field walking surveys. This information can be crucial for determining areas suitable for geophysical survey.

3f *Geophysical Survey*

Geophysical survey can be used to:

- determine the character and spatial extent of *known* sites on the proposed route which can not be avoided by route modifications.
- determine if any *known* sites lying close to the proposed route extend into it.
- locate, delimit and determine the character of previously *unknown* sites lying in the course of the proposed route.

There are a number of available techniques, the most appropriate of which are *magnetometry*, *magnetic susceptibility* and *resistivity.*

Magnetometry

This technique detects local variations in the earth's magnetic field, resulting from anthropogenic changes to soil. These variations are often caused by the presence of buried archaeological deposits (e.g. ditches, pits, buildings, *etc.*). This survey technique uses hand-held equipment, usually a Geoscan FM 35 Fluxgate Gradiometer.

The instrument can be used to scan large areas before focusing on smaller areas for detailed gridded survey, usually at 1m transect separation. Scanning is often used in tandem with magnetic susceptibility (see below) to identify areas of potential for detailed survey.

Magnetometry is most suited to shallow archaeology up to *c.*1-1.5m below ground level. It can operate in all weathers and is not prone to seasonal effects. In general, boulder clay and alluvium tend to be poorly responsive, whilst other solid geologies and riverine gravels are relatively conducive to magnetometry, although local iron concentrations can sometimes give spurious results. It can also be affected by magnetic fields (e.g. pylons). This technique is quick and cost-effective.

Magnetic susceptibility
This technique records variations of magnetic susceptibility within topsoil and subsoil. Enhanced susceptibility is often a sign of past human activity. It differs from magnetic scanning in that it locates areas of *archaeological activity* rather than discrete *features*. Magnetic susceptibility is often used in tandem with magnetic scanning to identify areas of potential for detailed survey.

Resistivity
In this method, an electric current is passed through the ground between a pair of mobile electrodes. The current passes more easily through soil which has a lower resistance (e.g. ditch fills), but is impeded by buried walls and road surfaces, which have a higher resistance. Survey involves pushing a pair of electrodes into the ground along transects 1m apart. A Geoscan RM15 resistivity meter with twin electrode configuration is commonly applied. A new attachment called a 'multi-plexer', and a technique called 'resistivity profiling' allows readings to be taken from multiple levels at the same time.

Resistivity is most suited to shallow archaeology up to *c.*1m below ground level. The technique is slower than magnetometry and can be hampered by hard ground; ideally the probes need soft damp soil for good conductivity. Resistivity is affected by seasonal variability of groundwater. Saturated soils or soils with a high saline content are likely to produce poor results. Natural geological variations can also make interpretation difficult. This type of survey can show greater detail than magnetometry.

Pipeline Application
Geophysics should preferably investigate the entire length, sampling an appropriate percentage of the width of the proposed easement.

Geophysical survey methods, magnetometer surveys in particular, have been applied routinely to pipeline evaluations since the mid 1970s. Geophysical survey methods are non-intrusive and can detect and precisely locate buried features for avoidance or subsequent investigation. There are two main options for coverage of the entire pipeline length:

- ***Two stage approach, using unrecorded magnetometer scanning and magnetic susceptibility survey followed by targeted detailed magnetometer survey***. This method is only effective when the ground is responsive enough to produce positive results. This survey strategy requires spontaneous, subjective interpretation as the unrecorded scanning survey progresses. As a consequence, this strategy does not provide a secure basis for eliminating areas that produce negative results from further consideration.

- ***Continuous, detailed, recorded magnetometer survey*** **(15m wide) along the centreline is recommended in preference to the two-stage method**. The reason for this is that only a *recorded* magnetometer survey can provide direct and objective evidence of the presence and character of individual archaeological features.

Stage 4 Field Evaluation

In some cases, where the results of field walking and/or geophysical survey are positive, and it is not possible or desirable to avoid a site, it may be necessary to undertake an evaluation in advance of construction. This might involve:

4a *machine-excavated trenches*
4b *hand-dug test-pits*

By using these techniques, it should be possible to confirm the presence or absence of archaeological deposits and to determine their character, extent, date and state of preservation. The choice of technique(s) will depend upon site-specific factors.

It may be desirable to undertake evaluation of certain category B or category C sites with high archaeological potential, even if the geophysical survey has failed to locate significant anomalies. Evaluation work is usually completed well in advance of pipeline construction.

Stage 5 Area Excavation

In occasional cases where the results of evaluation are positive, and it is not possible or desirable to avoid a site, area excavation may be the most appropriate course of action, in order to record a site prior to the construction of the pipeline. Precise excavation strategies for dealing with such archaeological remains will depend on site-specific factors. It is usually preferable to preserve significant archaeological deposits (such as settlements and burials) *in-situ*, by modifying the course of the pipeline.

Stage 6 Watching Brief (during construction)

A permanent-presence watching brief should take place during the construction of the pipeline. As a minimum, this consists of archaeological monitoring of all topsoil stripping and pipeline trench excavations. Archaeological deposits identified are ideally preserved *in situ*, or can be recorded by excavation.

Stage 7 Post-Excavation (Archive, Report and Publication)

A post-excavation programme for dealing with all records of investigated archaeological remains and recovered artefacts usually follows each of the stages outlined above. This includes the collation and cataloguing of all site records, the processing, conservation and cataloguing of artefacts, the production of an archive report, and, where appropriate, the drafting of articles for publication.

Appendix B

List of Abbreviations

LIST OF ABBREVIATIONS

AOD	Above Ordnance datum
AP	Aerial Photograph
CM	Cropmark
DBA	Site identified during the Desk-Based Assessment by Network Archaeology Ltd (largely from aerial photographs, and old sheet sources)
DMV	Deserted Medieval Village
LI.	Prefix to Aerial Photographs recorded by the NMP
LSMR	Lincolnshire Sites and Monuments Record
EH	English Heritage
IFA	Institute of Field Archaeologists
LB	Listed Building
MON	MONARCH data base (National Monuments Records from English Heritage) structures
NGR	National Grid Reference
NMP	National Mapping Programme
NMR	National Monuments Record
OS	Ordnance Survey
SAM	Scheduled Ancient Monument
SMR	Sites and Monuments Record
SMV	Srunken Medieval Village

Appendix C

Gazetteer of Archaeological Sites

Map	Reference	Source	description	Period	Category	Distance	NGR TF	Impact	Reliability L	Reliability I
1	42025	LSMR	3 cross-bow brooches	Roman	E	120m	412 734	-	H	M
1	42421	LSMR	partly polished flint axe	Neolithic	E	100m	381 767	-	H	H
1	42423	LSMR	polished stone axe	Neolithic	E	105m	385 766	-	H	H
1	42424	LSMR	hoard of silver coins in earthernware jar	Roman	E	460m	378 765	-	H	H
1	42440	LSMR	pit containing animal bone and brick	Undetermined	D	130m	39387620	-	H	H
1	42441	LSMR	Bluestone Heath Road	Multi-period	C	0m	39527532		H	H
1	42443	LSMR	polished stone archer's bracer	Early Bronze Age	E	220m	39157588	-	H	H
1	42444	LSMR	EW DMV; EW moat;EW field system; remains of church	Medieval	B	160m	386757 - 389756	-	H	H
1	43173	LSMR	?CM long barrow	Neolithic	B	480m	37577719	-	H	H
1	43176	LSMR	CM long barrow	Neolithic	B	320m	37617723	-	H	H
1	43334	LSMR	3 sherds of pottery	Saxo-Norman	E	840m	38857563	-	H	H
1	43907	LSMR	?Moot	early Medieval	D	700m	38707566	-	H	H
1	DBA:A	1st Ed. OS Map	site of windmill	Post-Medieval	C	20m	7991 376974	-	H	H
1	DBA:B	1st Ed. OS Map	trackway/bridleway	Post-Medieval	E	200m	39090 75630 - 39430 75850	-	H	H
1	DBA:C	1st Ed. OS Map	quarry pits	Post-Medieval	D	40m	39230 76170	-	H	H
1	LI.82.11.1	NMP	EW boundary	?Medieval	C	220m	3865 7616	unc	H	H
1	LI.82.16.1	NMP	CM Long Barrow	Neolithic	B	280m	758 399	-	H	H
1	LI.82.8.1	NMP	CM long barrow	?Neolithic	B	440m	3845 7609	-	H	H
1	LI.82.9.1	NMP	CM barrow	?Bronze Age	B	450m	3847 7609	-	H	H
1/2	DBA:G	1st Ed. OS Map	trackway	Post-Medieval	E	0m	43622 70481	unc	H	H
1/2	LI.24.10.1	NMP	CM enclosure	undetermined	C	0m	4062 7411	unc	H	H
1/2	LI.24.11.1	NMP	CM enclosure	?prehistoric	C	0m	4074 7432	unc	H	H
1/2	LI.24.12.1	NMP	CM enclosure	?prehistoric	C	0m	4058 7451	unc	H	H
1/2	LI.24.13.1	NMP	CM trackway	undetermined	C	0m	4059 7443	unc	H	H
1/2	LI.24.14.1	NMP	CM trackway	undetermined	C	0m	4052 7431	unc	H	H
1/2	LI.24.9.1	NMP	CM trackway	undetermined	C	160m	4063 7432	unc	H	H
2	42021	LSMR	pottery, including Samian ware	Roman	E	360m	408 736	-	H	H
2	42025	LSMR	3 bow brooches	Roman	E	140m	412 734	-	H	H
2	42028	LSMR	settlement site (excavated by Canon Tatham 1913-1923)	Roman	B	400m	408732	-	H	H
2	42035	LSMR	settlement site (excavated by Canon Tatham 1913-1923)	Roman	B	640m	40807310	-	H	H
2	43249	LSMR	SM/stone line of Roman Road; pits; pottery	Roman	C	200m	40907340	unc	H	H
2	43316	LSMR	Ulceby Cross Roads earlier road surface	Post-Medieval	E	0m	41147367	unc	H	H
2	DBA:E	1st Ed. OS Map	chalk quarry pit	Post-Medieval	E	170m	42376 71661	-	H	H
2	DBA:H	1st Ed. OS Map	former field boundaries	Post-Medieval	E	0m	41085 74220	-	H	H
2	DBA:I	LSMR	Grade II Listed building; Peacocks	Post-Medieval	A	252m	42286 72490	-	H	H
2	DBA:J	LSMR	Grade II Listed Building; Church of All Saints	Post-medieval	A	280m	42243 72611	-	H	H
2	LI.107.1	NMP	settlement	Roman	B	500m	410727	-	H	H
2/3	42032	LSMR	EW SMV & R&F	Medieval	B	10m	421729	unc	H	H

Map	Reference	Source	description	Period	Category	Distance	NGR TF	Impact	Reliability L	Reliability I
2/3	42062	LSMR	course of Roman Road, now known as Black Heath Road	Roman	C	0m	4300 7135	min	H	H
2/3	42895	LSMR	CM linear boundary and enclosure	undetermined	C	220m	42977100	-	H	H
2/3	42944	LSMR	Lincoln to Burgh le Marsh Roman Road	Roman	C	0m	50006520	unc	H	H
2/3	43199	LSMR	farmstead with CM enclosures and hut circles	mid-late Iron Age	C	80m	42797175	unc	H	H
2/3	43315	LSMR	3 flint flakes; 1 tranchet derivative arrowhead (unfinished)	Neolithic-Bronze A	E	10m	42037216	-	H	H
2/3	DBA:D	1st Ed. OS Map	former blacksmiths	Post-Medieval	B	50m	42070 72237	-	H	H
2/3	LI.109.5.2	NMP	CM long barrow	?Neolithic	B	120m	4235 7172	unc	H	H
2/3	LI.109.8.2	NMP	CM and EW long barrow	Neolithic	B	400m	4293 7087	-	H	H
2/3	SAM 27866	LSMR	Giants Hills 1 Long Barrow (excavated by C Philips 1933-	Neolithic	A	240m	42877110	unc	H	H
2/3	SAM 27867	LSMR	CM long barrow	Neolithic	B	200m	42357164	unc	H	H
2/3	SAM 27872	LSMR	Giants Hills III long barrow cropmark	Neolithic	A	140m	42777127	-	H	H
3	43817	LSMR	section through Roman Road	Roman	C	0m	44846975	-	H	H
3	DBA:F	1st Ed. OS Map	former field boundaries	Post-Medeival	E	0m	43622 70481	-	H	H

Appendix D

Archaeological Constraint Maps 1-3

Candlesby to Swaby Gas Pipeline
Archaeological Constraints Map Key

500m study corridor

Proposed pipeline route

Proposed Pipeline re-route


Category A Site


Category B Site


Category C Site


Category D Site


Category E Site

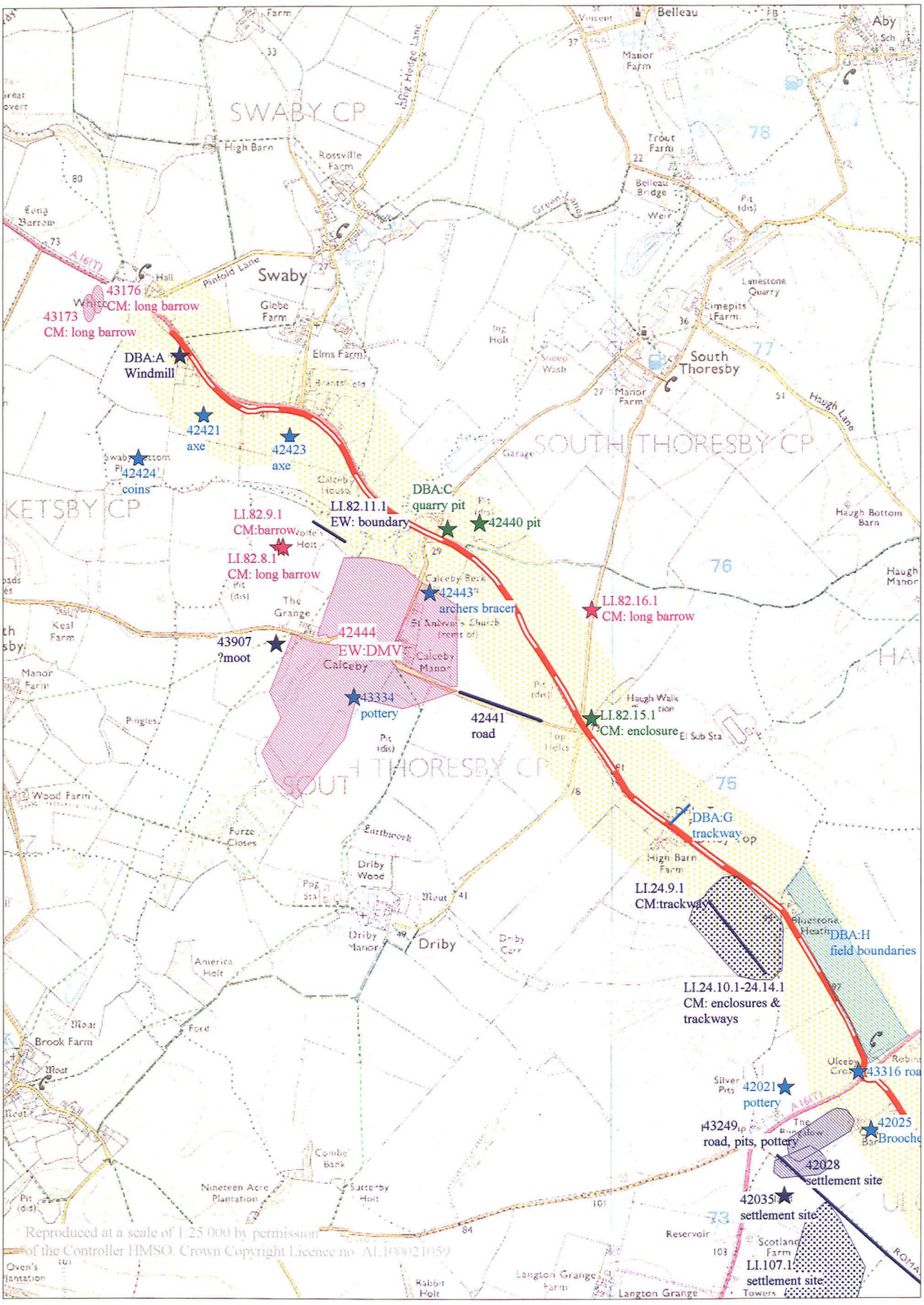

Known extent of archaeological site or find
(coloured according to category)


Known extent of archaeological site discovered by
aerial photography (coloured according to category)

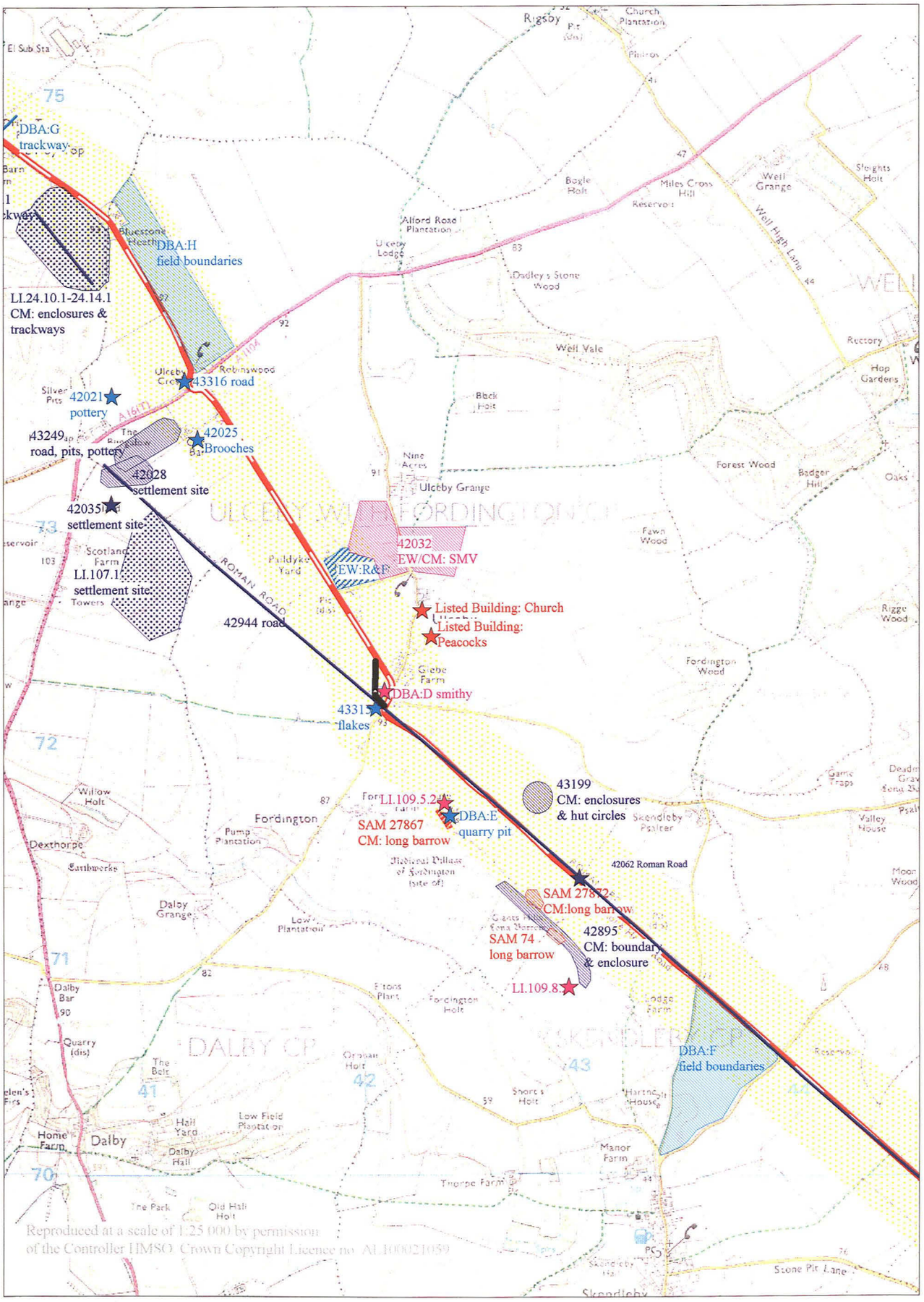
Extent of linear feature (e.g. railway, road, parish boundary
(coloured according to category)

Abbreviations

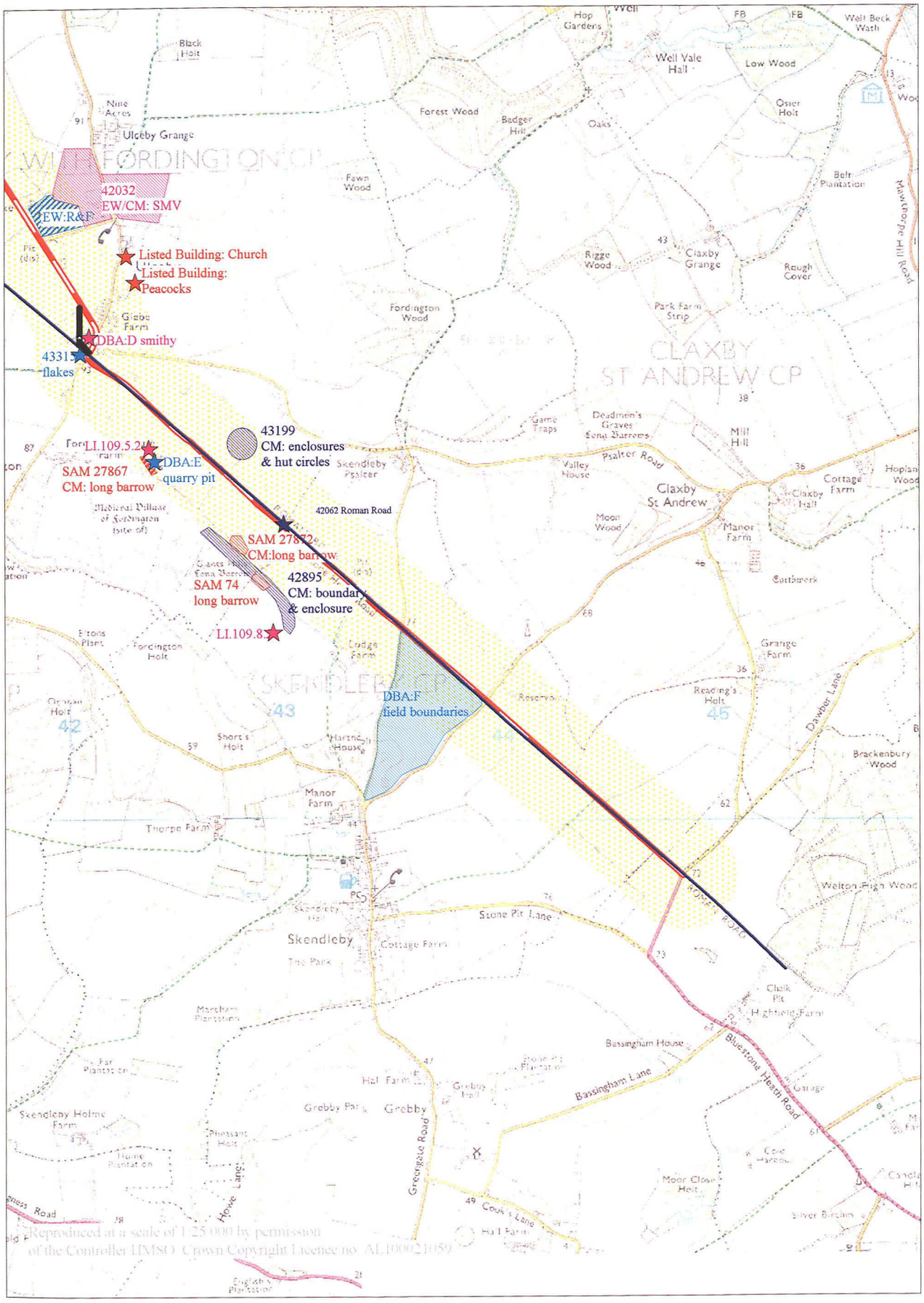
CM	Crop Mark
DBA	Desk Based Assessment
DMV	Deserted Medieval Village
EW	Earthwork
LI.	Prefix to aerial photograph number
R&F	Ridge and Furrow
SAM	Scheduled Ancient Monument
SMV	Shrunken Medieval Village



Constraint Map 1: Proposed Candlesby to Swaby Pipeline



Constraint Map 2: Proposed Candlesby to Swaby Pipeline



Constraint Map 3: Proposed Candlesby to Swaby Pipeline