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University of Durham

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Brompton, Northallerton, Romanby Flood Alleviation Scheme, North Yorkshire

Volume I - text

geophysical surveys

on behalf of

Mouchel Parkman UK Ltd

ASUD Report 1080
March 2004

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1 Summary

The project

- 1 1 This report presents the results of geophysical surveys conducted on land at Brompton, Northallerton and Romanby, North Yorkshire, in advance of proposed flood alleviation works. The study area comprised land adjacent to five becks, totalling 259ha. A 25% sample of each of the five areas was surveyed.
- 1 2 The works were commissioned by Mouchel Parkman UK Ltd and conducted by Archaeological Services University of Durham (ASUD) in accordance with a Methods Statement provided by ASUD, prepared following discussions between Mouchel Parkman and the Heritage Unit at North Yorkshire County Council.

Results

- 1 3 Ridge and furrow cultivation remains, typically medieval in origin, have been detected throughout the study area. Former field boundaries, possible settlement plots, droveways/tracks and miscellaneous ditch features have been detected in places. In general, the proposed excavation/flood areas will not impact on the potentially more significant archaeological features, such as a possible roadside settlement at Long Lane, a former Roman road.
- 1 4 Further archaeological works which might be required in relation to the proposed development comprise further geophysical survey where the potential impact of excavation for water storage areas remains unknown, trial trench evaluation of possible archaeological features in areas which are to be landscaped for water storage, watching brief during groundworks for water storage areas and temporary works yards.

2 Project background

Location (Figure 1)

- 2.1 The study area comprises land at Brompton, Northallerton and Romanby in North Yorkshire, primarily on the north and east sides of Northallerton and concentrated around the following five becks North Beck, Sun Beck, Turker Beck, Ing Beck and Winton Beck
- 2.2 Plans indicating the extent of archaeological investigation were supplied by Mouchel Parkman (MCL Drawing nos Sketch 004, 005 & 006, Job no 77052) The total area under consideration covers 259.2ha, which is divided between the becks as follows

	Beck	Area (ha)
E3117	North Beck	70.27
E2058	Sun Beck	29.84
E3114	Turker Beck	26.74
E3128	Ing Beck	83.57
E3122	Winton Beck	48.77
	Total	259.19

Development proposal

- 2.3 The proposal is for the provision of a flood alleviation scheme

Objective

- 2.4 The principal aim of the surveys was to determine the extent and nature of any sub-surface features of likely archaeological interest, including cut, built and fired features, which would assist the client and the planning authority in determining appropriate mitigation strategies should archaeological deposits be found to survive within the study area
- 2.5 In this instance the Heritage Unit at North Yorkshire County Council recommended that a Level II Strategy (IFA 2002) be adopted, comprising gradiometer survey of a 25% sample of each area in the first instance, with a further 25% to be undertaken on a contingency basis should the initial surveys detect significant geophysical anomalies

Dates

- 2.6 The surveys were undertaken between 12th January and 19th February 2004 This report was prepared between 26th January and 5th March 2004

Personnel

- 2.7 The fieldwork was conducted by Will Davies (Supervisor), Ed Blinkhorn, Richard Cramp, Duncan Hale, Martin Railton and Mark Randerson This report was prepared by Duncan Hale (the Project Manager) with illustrations by David Graham, Linda Bosveld and Duncan Hale

Acknowledgements

- 2 8 Archaeological Services is grateful to the client and the landowners and farmers for their cooperation with this project

Archive

- 2 9 The survey archive is currently held at Archaeological Services, University of Durham. It is anticipated that the survey data archive will be transferred to the Archaeology Data Service in due course

3 Landuse, topography and geology

- 3 1 At the time of fieldwork the study area comprised a rural mixed farming landscape. Fields were typically in use for cereal crops or pasture, with occasional brassica, hay or stubble

North Beck Area 2	pasture	Ing Beck Area 1	cereal
North Beck Area 3	pasture	Ing Beck Area 2	cereal
North Beck Area 4	pasture	Ing Beck Area 3	pasture
North Beck Area 5	pasture	Ing Beck Area 4	pasture
North Beck Area 6	pasture	Ing Beck Area 5	cereal
North Beck Area 7	cereal	Ing Beck Area 6	stubble
North Beck Area 8	pasture	Ing Beck Area 7a	pasture
Sun Beck Area 1	cereal	Ing Beck Area 7b	pasture
Sun Beck Area 2	cereal	Ing Beck Area 8	cereal
Sun Beck Area 3	brassica	Winton Beck Area 1	cereal
Sun Beck Area 4	brassica	Winton Beck Area 2	hay
Turker Beck Area 1	cereal	Winton Beck Area 3	pasture
Turker Beck Area 2	cereal	Winton Beck Area 4	pasture
Turker Beck Area 3	cereal	Winton Beck Area 5	hay

- 3 2 The landscape is gently undulating, lying at between 40-75m AOD
- 3 3 The local solid geology comprises Triassic mudstones, with Jurassic Great and Inferior Oolite further east. These are overlain by glacial and alluvial deposits

4 Geophysical survey

Standards

- 4 1 The surveys and reporting were conducted in accordance with English Heritage (1995) Research and Professional Services Guideline No 1, *Geophysical survey in archaeological field evaluation*, the Institute of Field Archaeologists (2002) Paper No 6, *The use of geophysical techniques in archaeological evaluations*, and the Archaeology Data Service (2001) *Geophysical Data in Archaeology: A Guide to Good Practice*

Technique selection

- 4 2 Given the anticipated shallowness of targets (<1 5m in depth) and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting any cut, built and fired archaeological features which might be present This technique involves the use of a hand-held magnetometer to detect and record anomalies in the vertical component of the Earth's magnetic field, such anomalies often reflect archaeological features

Field methods

- 4 3 A Leica GS50 Global Positioning System (GPS) was used to set out and record the coordinates of each survey block The GPS accuracy of each point was between 0 3-0 6m, typically using 8-11 satellites
- 4 4 Measurements of vertical geomagnetic field gradient were determined using Geoscan FM36 and FM256 fluxgate gradiometers with automatic datalogging facilities A zig-zag traverse scheme was employed and data were logged in 30m grid units The instrument sensitivity was set to 0 InT, the sample interval to 0 5m and the traverse interval to 1 0m, thus providing 1800 sample measurements per 30m grid unit
- 4 5 Data were downloaded on-site into laptop computers for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving

Data processing

- 4 6 Geoplot v3 00(K) software was used to process the geophysical data and to produce both continuous tone greyscale images and trace plots of the raw data The greyscale images and interpretations are presented at 1 1000/1 1250 in Figures 2-80, the trace plots are provided in Appendix I (Figures 81-108) In the greyscale plots, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey A palette bar relates the greyscale intensities to anomaly values in nanoTesla
- 4 7 The following basic processing functions have been applied to each gradiometer dataset

Clip – clips, or limits, data to specified maximum or minimum values, for limiting large noise spikes, also generally makes statistical calculations more realistic

Zero mean traverse – sets the background mean of each traverse within a grid to zero, for removing striping effects in the traverse direction and removing grid edge discontinuities

Interpolate – increases the number of data points in a survey, to match sample and traverse intervals and so create a smoother appearance to the data In this instance the gradiometer data have been interpolated from 1 0 x 0 5m intervals to 0 5 x 0 5m intervals

- 4 8 The following basic processing functions have been applied to specific gradiometer datasets

Despike – locates and suppresses random iron spikes in gradiometer data (Turker Beck Area 1, Ing Beck Area 6)

Destagger – corrects for displacement of anomalies caused by alternate zig-zag traverses (Ing Beck Area 6, Winton Beck Area 4)

5 Geophysical interpretation

- 5 1 Colour-coded geophysical interpretation plans are provided for each survey area Three types of geomagnetic anomaly have been distinguished in the data

positive magnetic regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches

negative magnetic regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility, such as wall footings and other concentrations of sedimentary rock or voids

dipolar magnetic paired positive-negative magnetic anomalies, which typically reflect ferrous or fired debris and/or fired structures such as kilns or hearths

E3117

6 North Beck interpretation

- 6 1 Total area 70 27ha, sample surveyed 15 66ha / 22 29% as follows

Area 2	2 61ha	Area 6	0 81ha
Area 3	5 85ha	Area 7	2 70ha
Area 4	1 35ha	Area 8	1 08ha
Area 5	1 26ha		

- 6 2 Colour-coded archaeological interpretation plans are provided for each survey area

North Beck Area 1

- 6 3 The survey of the arable fields in the south-western corner (Area 1) of North Beck was initially postponed at the farmer's request due to waterlogging and damage to crop, and then abandoned due to time constraints Coverage was extended in other areas to compensate

North Beck Area 2 (Figures 2-5)

- 6 4 A series of parallel, slightly curving, positive magnetic lineations have been detected aligned north-east/south-west across this area The anomalies are

relatively weak and are regularly spaced at *c* 6m intervals. These anomalies almost certainly reflect the sub-surface remains of ridge and furrow cultivation, a common practice during the medieval period. Additional weak positive magnetic lineations have been detected parallel and adjacent to the north-eastern field boundary. These typically reflect high magnetic susceptibility soil-filled features.

- 6 5 The only other anomalies detected here are small, discrete dipolar magnetic anomalies. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments.

North Beck Area 3 (Figures 2, 6-8)

- 6 6 A series of parallel, slightly curving, positive magnetic lineations have also been detected aligned north-east/south-west across this area, most evidently in the western part. The anomalies are again relatively weak and regularly spaced at *c* 6m intervals. These anomalies are almost certainly a continuation of the ridge and furrow remains detected in Area 2. A positive magnetic lineation dividing this area into two parts represents a former field boundary. To the east of this boundary the ridge and furrow remains are extremely weak, probably as a result of ploughing in more recent times.

- 6 7 A low concentration of small, discrete dipolar magnetic anomalies has again been detected, almost certainly reflecting items of near-surface ferrous and/or fired debris. A larger ferrous item has been detected at the south-eastern limit of the survey.

North Beck Area 4 (Figures 2, 9-11)

- 6 8 A series of parallel, alternate, positive and negative magnetic lineations have been detected across much of this area. The anomalies are aligned broadly north-west/south-east and are regularly spaced at *c* 6m intervals. These anomalies almost certainly reflect the remains of ridge and furrow cultivation. Two negative magnetic lineations have been detected perpendicular to the ridge and furrow, these post-date the ridge and furrow and correspond to shallow ditches observed in the field. Two positive magnetic lineations have also been detected perpendicular to the ridge and furrow, these almost certainly reflect soil-filled ditches, of unknown relationship to the ridge and furrow.
- 6 9 A concentration of dipolar magnetic anomalies detected in the southern corner of this area corresponds to a disturbed patch of ground containing much brick and tile rubble, observed in the field. A number of small, discrete dipolar magnetic anomalies have also been detected across this area.

North Beck Area 5 (Figures 2, 9-11)

- 6 10 A number of former field boundaries are evident in this survey as broad positive magnetic anomalies, some of these are shown on the current edition (2000) OS Explorer map. Ridge and furrow farming remains have been detected on two alignments within the former fields, at *c* 6m intervals. An additional positive magnetic lineation, probably reflecting a narrow soil-filled

feature, has been detected traversing the ridge and furrow in the northern part of the survey

- 6 11 A number of small, discrete dipolar magnetic anomalies have been detected across this area, particularly adjacent to the former field boundaries
- 6 12 This survey area was extended to the south in order to include some low earthworks noted during fieldwork. These comprised a broad low bank and a broad shallow ditch but they have not been identified in the survey data

North Beck Area 6 (Figures 2, 12-14)

- 6 13 Extremely faint traces of ridge and furrow farming have been detected here aligned broadly east-west. Additional weak, broad and diffuse positive magnetic anomalies have also been detected in the eastern part of the survey. These are likely to reflect soil-filled features, though possibly former stream channels as opposed to archaeological features. A number of dipolar magnetic anomalies, typically reflecting ferrous litter, have been detected

North Beck Area 7 (Figures 2, 15-17)

- 6 14 Two sets of parallel positive magnetic lineations are present in the data. These almost certainly reflect ridge and furrow cultivation remains. The western features are aligned north-east/south-west, are again evenly spaced at c 6m intervals and appear to be a continuation of those detected in Area 2. The eastern features are aligned north-west/south-east and are again at 6m intervals
- 6 15 A concentration of dipolar magnetic anomalies is evident in the north-western corner of the survey. This corresponds to an area of brick and tile rubble noted in the field, the farmer mentioned the former presence of a building here. A weak, discontinuous anomaly appears to extend south-east from here, perhaps reflecting a feature associated with the former building

- 6 16 Two large, and numerous small, dipolar magnetic anomalies are interpreted as reflecting ferrous debris

North Beck Area 8 (Figures 2, 18-20)

- 6 17 A number of broad diffuse positive magnetic anomalies have been detected. The irregular form of many of these anomalies may indicate a geological origin, however, an archaeological origin cannot be discounted without further, intrusive, work. A curvilinear anomaly in the north-east corner of the survey area, measuring c 15m in diameter, could reflect a soil-filled ring-ditch of archaeological significance
- 6 18 A very intense curvilinear anomaly in the south-east part of the survey may derive from straightening of the beck to the east and subsequent filling of the former meander with rubbish. Additional dipolar magnetic anomalies are also likely to reflect near-surface ferrous litter, with the exception of one near the centre of the survey which reflects a telegraph pole

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7 Sun Beck interpretation

7.1 Total area 29.84ha, sample surveyed 7.20ha / 24.13% as follows

Area 1 1.08ha

Area 2 3.24ha

Area 3 1.44ha

Area 4 1.44ha

7.2 Colour-coded archaeological interpretation plans are provided for each survey area

Sun Beck Area 1 (Figures 21-24)

7.3 A number of intense magnetic anomalies have been detected here. In the southern part of the survey, intense positive magnetic lineations almost certainly reflect former ditched boundaries to small enclosed fields, one of which may have a clavicular entrance on its northern side. Within the same enclosure an intense arcuate positive magnetic anomaly almost certainly reflects a soil-filled ring-ditch.

7.4 Immediately north of this relict field system the ridge and furrow remains, represented by weak, parallel, positive magnetic lineations c. 6m apart, aligned north-east/south-west. A further ditched boundary has been detected to the north of these remains, with the possible remains of another ditched boundary 6m north again. If the latter ditch is real then these two features could comprise a double-ditched trackway or droveway.

7.5 A low concentration of small dipolar magnetic anomalies has been detected, typically reflecting near-surface ferrous and fired debris.

Sun Beck Area 2 (Figures 21, 25-27)

7.6 Faint traces of ridge and furrow cultivation are present across this area, detected in the form of weak parallel positive magnetic anomalies, broadly aligned with those in Area 1. The tentative remains of a short length of ditch, perpendicular to the ridge and furrow, may also have been detected.

7.7 Once again, a scatter of small dipolar magnetic anomalies has been detected, typically reflecting near-surface ferrous and fired debris.

Sun Beck Area 3 (Figures 21, 28-30)

7.8 Faint traces of ridge and furrow cultivation are present across this area, detected in the form of weak parallel positive magnetic anomalies, in this case aligned north-west/south-east. The only other anomalies detected here reflect small items of ferrous/fired litter.

Sun Beck Area 4 (Figures 21, 31-33)

7.9 Ridge and furrow remains are evident here as weak parallel positive magnetic anomalies, aligned north-east/south-west. Extremely weak, arcuate positive

magnetic anomalies have also been detected. It is possible that these reflect the scant remains of former ditches or gullies.

- 7 10 A low concentration of small dipolar magnetic anomalies has been detected, typically reflecting near-surface ferrous and fired debris.

E31.4

8 **Turker Beck interpretation**

- 8 1 Total area 26 74ha, sample surveyed 8 37ha / 31 30% as follows

Area 1	3 51ha
Area 2	4 32ha
Area 3	0 54ha

- 8 2 The survey of the large arable field in the southern part of this area was initially postponed due to waterlogging and damage to the young cereal crop, however, as the ground conditions did not improve within the project time constraints this field was abandoned and coverage was extended in the two fields to the north. Areas 1 and 3 can therefore be regarded as one survey area.

- 8 3 Colour-coded archaeological interpretation plans are provided for each survey area.

Turker Beck Areas 1 & 3 (Figures 21, 34-36)

- 8 4 Extremely faint traces of ridge and furrow cultivation are present across this area, detected as weak parallel positive magnetic anomalies, broadly aligned north-west/south-east and evenly spaced at 5-6m intervals.
- 8 5 Two positive magnetic anomalies flanking a negative magnetic anomaly have been detected in the south-east corner of this survey. This almost certainly reflects the remains of a double-ditched trackway which ran along the side of Turker Beck.

- 8 6 A scatter of small dipolar magnetic anomalies has been detected across the area, typically reflecting near-surface ferrous and fired debris.

Turker Beck Area 2 (Figures 21, 37-39)

- 8 7 Weak traces of ridge and furrow cultivation have been detected across the northern part of this survey area, aligned north-east/south-west and evenly spaced at 5-6m intervals. A positive magnetic lineation has also been detected here, parallel to the northern field boundary. It is likely that this anomaly reflects a former ditched field boundary.
- 8 8 A large dipolar magnetic anomaly at the western limit of the survey area corresponds to a pylon. A weak, discontinuous magnetic anomaly heading south from the pylon almost certainly reflects the fill of a cable trench.
- 8 9 A spread of small dipolar magnetic anomalies has been detected across the area, typically reflecting near-surface ferrous and fired debris.

E3128

9 Ing Beck interpretation

9 1 Total area 83 57ha, sample surveyed 21 52ha / 25 75% as follows

Area 1	1 08ha	Area 6	2 70ha
Area 2	5 13ha	Area 7a	0 81ha
Area 3	2 84ha	Area 7b	0 63ha
Area 4	4 28ha	Area 8	3 15ha
Area 5	0 90ha		

9 2 Colour-coded archaeological interpretation plans are provided for each survey area

Ing Beck Area 1 (Figures 40-43)

9 3 Occasional faint traces of ridge and furrow cultivation are present in this area, detected as very weak parallel positive magnetic anomalies, broadly aligned north-east/south-west at c 5m intervals

9 4 A low concentration of small dipolar magnetic anomalies has been detected, typically reflecting near-surface ferrous and fired debris

Ing Beck Area 2 (Figures 40, 44-46)

9 5 A series of parallel, slightly curving positive magnetic lineations has been detected here, reflecting ridge and furrow remains aligned broadly north-south at c 5m intervals. The remains are evident in the data across most of this area

9 6 Several weak, east-west anomalies have been detected near the eastern limit of the survey area. These typically reflect high magnetic susceptibility soil-filled features, such as ditches, enclosing plots of land along the western side of Long Lane. Although the dates of these features are unknown, the lane follows the former course of a Roman road and it is possible that these plots could have been part of a Roman roadside settlement

9 7 Various broad and diffuse geomagnetic anomalies have been detected in the central southern part of the survey. These anomalies are likely to be geological in origin, appear to be beneath the ridge and furrow, and probably reflect former meanders in the small beck along the southern side of the field. It appears that this beck was straightened at some time before the ridge and furrow was established

9 8 A spread of small dipolar magnetic anomalies has been detected across the area, typically reflecting near-surface ferrous and fired debris

Ing Beck Area 3 (Figures 40, 47-49)

9 9 An electric fence divided this area in two. A series of parallel, slightly curving positive magnetic lineations has been detected across most of this area, reflecting ridge and furrow remains aligned broadly north-east/south-west at c 5m intervals. These are part of the same system as those detected in Area 1

- 9 10 Occasional positive magnetic lineations, almost certainly reflecting high magnetic susceptibility soil-filled features such as ditches, have been detected here. One of these certainly corresponds to a former field boundary.
- 9 11 A chain of intense dipolar magnetic anomalies has been detected along the western limit of the survey area. This almost certainly corresponds to a ferrous service pipe. A low concentration of small dipolar magnetic anomalies has also been detected, typically reflecting near-surface ferrous and fired debris.

Ing Beck Area 4 (Figures 40, 50-52)

- 9 12 An electric fence divides this area into two parts. Faint traces of ridge and furrow have been detected across parts of this area, as weak parallel positive magnetic lineations.
- 9 13 A number of weak, irregular and diffuse anomalies in this area are likely to reflect geological variation, probably former courses of Ing Beck.
- 9 14 Occasional small dipolar magnetic anomalies have been detected across the area, almost certainly reflecting ferrous and fired litter.

Ing Beck Area 5 (Figures 40, 53-55)

- 9 15 Parallel positive magnetic anomalies detected here reflect ridge and furrow remains, part of the same system as recorded in Areas 1 and 3. The only other anomalies detected here reflect near-surface litter.

Ing Beck Area 6 (Figures 40, 56-58)

- 9 16 A series of parallel, alternate positive and negative magnetic lineations has been detected, again reflecting ridge and furrow remains, almost certainly part of the same system as recorded in Area 2, above.
- 9 17 A number of weak, irregular and diffuse anomalies have also been detected in this area and are likely to reflect geological variation, probably former stream courses.
- 9 18 The only other anomalies detected here almost certainly reflect small items of near-surface litter.

Ing Beck Area 7a (Figures 40, 59-61)

- 9 19 Faint traces of ridge and furrow have been detected at the eastern end of this survey area, aligned as per the remains in all these northern survey areas at Ing Beck.
- 9 20 Intense positive magnetic anomalies detected near the centre of this area may reflect a geological feature. Occasional small dipolar magnetic anomalies have been detected across the area, almost certainly reflecting ferrous and fired litter.

Ing Beck Area 7b (Figures 40, 59-61)

- 9 21 Remains of ridge and furrow have been detected across this survey area, aligned as per the remains in all these northern survey areas at Ing Beck
- 9 22 Two weak and diffuse positive magnetic anomalies have also been detected in this area and are likely to reflect geological variation, possibly former stream courses, as detected in Area 4 just to the north
- 9 23 Occasional small dipolar magnetic anomalies have been detected across the area, almost certainly reflecting ferrous and fired litter

Ing Beck Area 8 (Figures 40, 62-64)

- 9 24 Relatively strong, parallel, positive magnetic lineations across this area again reflect ridge and furrow cultivation remains, aligned north-east/south-west at c 5m intervals, similar to the rest of the ridge and furrow in this general area
- 9 25 A number of other positive magnetic anomalies have also been recorded here. The more intense ones are broad and diffuse and, whilst almost certainly soil-filled, are more likely to reflect a geological feature such as a palaeochannel rather than an archaeological feature. The other anomalies are very weak but may overlie i.e. post-date the ridge and furrow, these are likely to reflect ditch features
- 9 26 The only other anomalies detected here almost certainly reflect small items of near-surface ferrous litter

E3122

10 Winton Beck interpretation

10 1 Total area 48 77ha, sample surveyed 15 48ha / 31 74% as follows

Area 1	2 88ha	Area 4	3 33ha
Area 2	2 52ha	Area 5	2 88ha
Area 3	3 87ha		

10 2 Colour-coded archaeological interpretation plans are provided for each survey area

Winton Beck Area 1 (Figures 65-68)

- 10 3 A series of weak, parallel, positive magnetic lineations across this area reflect ridge and furrow cultivation remains, aligned north-north-west/south-south east at 5-6m intervals
- 10 4 Several weak, rectilinear anomalies have been detected near the western limit of this survey area. These typically reflect high magnetic susceptibility soil-filled features, such as ditches, enclosing plots of land on the eastern side of Long Lane. This survey was undertaken just across the lane from Ing Beck Area 2, where similar features were detected. Although the dates of these features are unknown, the lane follows the former course of a Roman road and

it is possible that these plots could have been part of a Roman roadside settlement

- 10 5 Occasional small dipolar magnetic anomalies have been detected across the area, almost certainly reflecting ferrous and fired litter

Winton Beck Area 2 (Figures 65, 69-71)

- 10 6 The only anomalies detected here comprise broad diffuse positive magnetic anomalies and small dipolar magnetic anomalies. The former are likely to reflect geological features while the latter almost certainly reflect near-surface debris. No features of likely archaeological interest have been identified.

Winton Beck Area 3 (Figures 65, 72-74)

- 10 7 Two sets of parallel, slightly curving positive magnetic lineations have been detected here, reflecting ridge and furrow remains aligned broadly north-west/south-east at 5-6m intervals. The remains are evident in the data across most of this area, to the north and south of a former ditched track or driveway represented by another two positive magnetic lineations.
- 10 8 Additional, very weak, positive magnetic anomalies have been detected in the southern part of the survey. These may reflect the remains of other soil-filled ditch features.
- 10 9 A spread of small dipolar magnetic anomalies has been detected across the area, typically reflecting near-surface ferrous and fired debris.

Winton Beck Area 4 (Figures 65, 75-77)

- 10 10 A series of parallel, alternate positive and negative magnetic lineations has been detected, again reflecting ridge and furrow remains, almost certainly part of the same system as recorded in Area 3, above, and Area 5, below.
- 10 11 A scatter of small dipolar magnetic anomalies has been detected across this area, with an increased concentration in the north-east near the farm buildings. These almost certainly reflect near-surface ferrous and fired debris.

Winton Beck Area 5 (Figures 65, 78-80)

- 10 12 A series of weak, parallel, positive magnetic lineations has been detected, again reflecting ridge and furrow remains, almost certainly part of the same system as recorded in Areas 3 and 4. These anomalies are more evident towards the western end of the survey area.
- 10 13 An extremely weak, curvilinear positive magnetic anomaly has been detected near the centre of the survey. This could reflect the scant remains of a soil-filled ditch.
- 10 14 Occasional small dipolar magnetic anomalies have been detected across the area, almost certainly reflecting ferrous and fired litter.

11 Potential impact of proposed development

- 11 1 The potential impact of the proposed works for the flood alleviation scheme on known archaeological remains are discussed with reference to plans received on 4th March 2004. The plans for the Turker and Sun Beck areas were already at the preliminary/planning stage (MCL Drawing nos 05A-001, 2, 3, 4, & 5, 05B-001, 2, 3, 4 & 5, Job no 77052), while those for the other areas were still being developed and so were supplied as sketch plans. The plans show the approximate extents of excavation/flood areas, embankments and flow control structures. The locations of works yards/hardstanding are not indicated and so their potential impacts are currently unknown, it is possible that these could impact on archaeological remains, depending on their locations.

North Beck

- 11 2 The arable fields in the south-western part of this area, which were not surveyed, are outside the area of proposed excavation/flooding.
- 11 3 The proposed development works would impact on ridge and furrow remains in Areas 3, 4, 5, 6, 7 and 8, to varying degrees. Some of these areas also appear to contain headlands, former field boundaries, occasional other ditches and disturbed areas which would also be impacted by the proposed works. Area 8 in particular contains a number of features of uncertain origin, some of which may be archaeological, including a possible ring-ditch.

Sun Beck

- 11 4 The majority of the geophysical surveys were undertaken on land outside the proposed excavation/flood area. The only known impact of the proposed works would be on ridge and furrow cultivation remains in Area 2.

Turker Beck

- 11 5 The only known impact of the proposed works would be on ridge and furrow cultivation remains in Area 2.

Ing Beck

- 11 6 The only known impact of the proposed works would be on ridge and furrow cultivation remains in Areas 3, 4, 7a, 7b and 8. Other geomagnetic anomalies in Area 4 are considered likely to reflect geological features. The possible remains of a roadside settlement on the west side of Long Lane are outside the proposed excavation/flood area.

Winton Beck

- 11 7 The only known impacts of the proposed works would be on ridge and furrow cultivation remains in Areas 2, 3 and 5 and a possible curvilinear ditch near the centre of Area 5. The possible remains of a roadside settlement on the east side of Long Lane are outside the proposed excavation/flood area.

- 11 8 The proposed excavation/flood area extends further east than the area for archaeological investigation originally indicated, the potential impact there is therefore currently unknown

12 Conclusions and recommendations

- 12 1 Fluxgate gradiometer surveys have been undertaken to the north and east of Northallerton, in order to assess the potential survival of archaeological features there prior to proposed works for a flood alleviation scheme. The study area comprised land adjacent to five becks, totalling 259ha. A 25% sample of each of the five areas was surveyed.
- 12 2 Ridge and furrow cultivation remains, typically medieval in origin, have been detected throughout the study area. Former field boundaries, possible settlement plots, droveways/tracks and miscellaneous ditch features have been detected in places. In general, the proposed excavation/flood areas will not impact on the potentially more significant archaeological features, such as the possible roadside settlement at Long Lane, a former Roman road.
- 12 3 Since the ridge and furrow remains do not survive as upstanding earthworks (with the exception of one small area at NGR SE 3873 9740), and have already been recorded in plan form by the geophysical surveys, there is no added value to be gained from further work on them, such as topographic survey or section excavation.
- 12 4 Further archaeological works which might be considered in relation to the proposed development comprise
- further geophysical survey where the potential impact of excavation for water storage areas remains unknown, for example the east end of the Winton Beck area, the southern part of the Turker Beck area (if/when ground conditions improve), the western part of the Sun Beck area, and land to the east of Hilton Grange, North Beck. The necessity for these additional surveys is in part dependent on the extent of excavation required to create the water storage areas.
 - trial trench evaluation of possible archaeological features in areas which are to be landscaped for water storage, for example at North Beck Area 8, Winton Beck Area 5, and other potential archaeological features detected during additional survey work outlined above.
 - watching brief during groundworks for water storage areas and temporary works yards.

13 References

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Appendix I

trace plots of geophysical surveys